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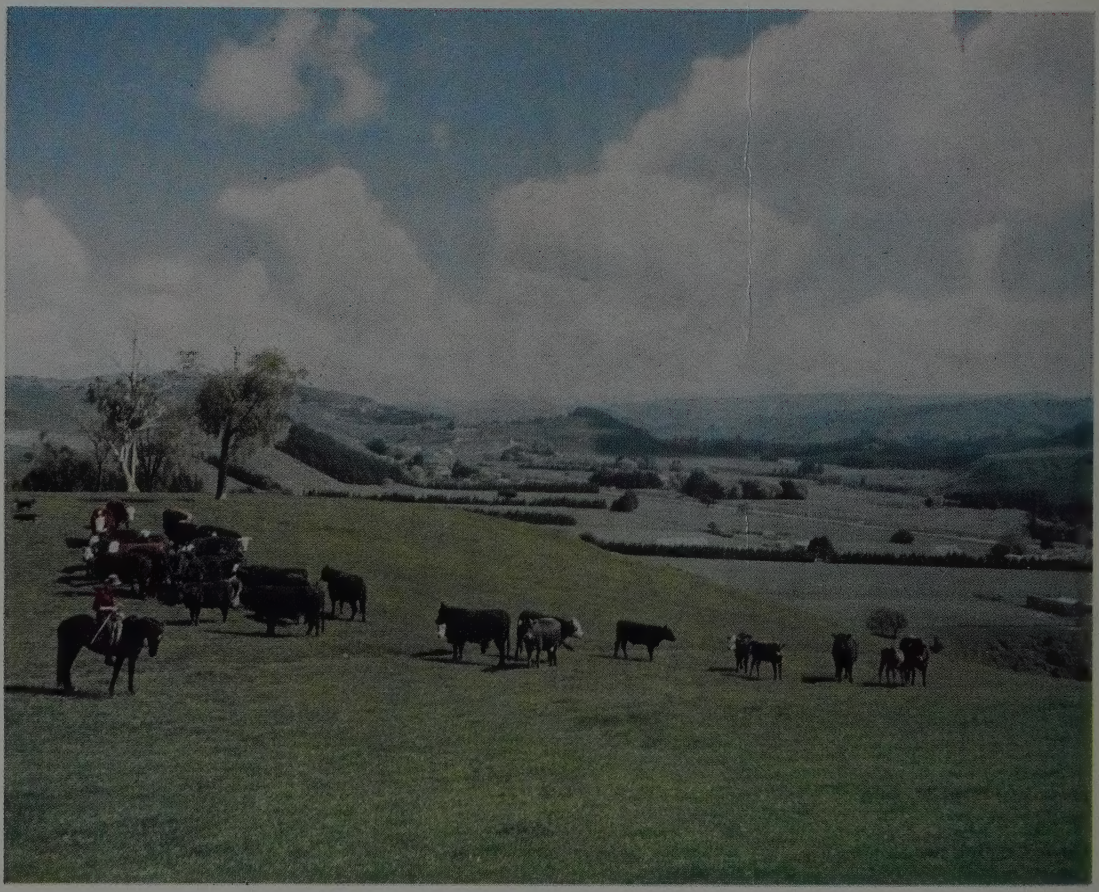

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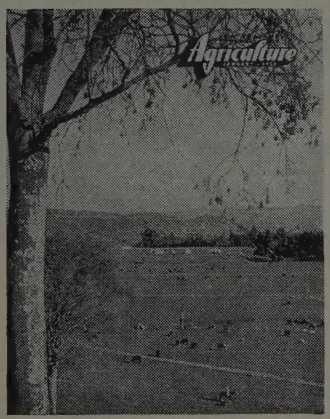
## This Month's Cover




*A pastoral scene in the Hiwira Valley, in the upper Rangitikei district, is the subject of this month's cover, which has been reproduced from a colour photograph by National Publicity Studios. In the Rangitikei district are some of the most prosperous and picturesque pastoral lands of New Zealand. Hill country sheep farming predominates, and methods of management vary from intensive to semi-intensive according to climate and soil cover, as determined by topography, soil type, and altitude. The surrounding farmlands are noted for the quality of their breeding and store stock, which is keenly sought by buyers from the Waikato and Hawke's Bay districts. Wool, fat lambs, and to a less extent dairy produce are additional items of farm revenue.*

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## "Auspicious Grassland Occasion"

# Seventh International Congress in New Zealand

**THE Seventh International Grassland Congress held at Massey Agricultural College, Palmerston North, from 6 to 15 November, 1956, was attended by about 300 participants representing 36 countries. It was the first time the congress had been held in the Southern Hemisphere and only the second congress to have been held outside Europe. The congress comprised 13 continuous sessions at each of which 4 papers were presented. Sir Bruce Levy, chairman of the New Zealand organising committee of the congress, was elected president of the congress on the motion of Dr. William Davies, leader of the United Kingdom delegation, seconded by Dr. R. E. Wagner, of the United States delegation.**

### OPENING CEREMONIES

"THIS congress is greatly honoured by the presence of his Excellency the Governor-General of New Zealand, Sir Willoughby Norrie, and Lady Norrie and is highly appreciative that his Excellency deemed this occasion of sufficient national and international importance to agree to give the official opening address," said Sir Bruce Levy in asking Sir Willoughby to open the congress at a colourful ceremony at the Opera House, Palmerston North. Represented in the official party were the New Zealand Government, the Palmerston North City Council, the New Zealand Grassland Association, Massey Agricultural College, the Department of Agriculture, the Department of Scientific and Industrial Research, the University of New Zealand, the Royal Agricultural Society of New Zealand, and Federated Farmers of New Zealand.

"We are particularly pleased that the Prime Minister, the Rt. Hon. S. G Holland, who has such heavy responsibilities to bear, should have come here tonight in spite of the anxieties of the world situation," said Sir Willoughby. "This confirms the great importance our Government places on the congress. We in New Zealand are delighted and very proud to have you here."

The large number of scientists from the many countries represented proved the tremendous interest taken in grasslands, and the holding of the congress in Palmerston North was a well-deserved compliment to the Manawatu and New Zealand as a whole. "You scientists are continually making discoveries and sharing your increased knowledge to the benefit of mankind. Here I would like to pay a tribute to the great service rendered to this country by Sir Bruce Levy, who has carried on and extended the work of Mr. A. H. Cockayne. It is good to know that their work is known and appreciated throughout the world.

"One of the many fine qualities possessed by the New Zealand farmer is that he has the good judgment and sense to listen to and to put to good use the findings of our scientists."

New Zealand's natural advantages in soil and pastures were referred to by Sir Willoughby, who said he had been very much impressed by the work he had seen at research centres throughout New Zealand. The work on trace elements had shown how a few ounces of copper, molybdenum, or cobalt could in some areas transform bad land into good, and the striking evidence of the success of this development around Rotorua and in the far north made it hard to believe that only 7 years ago the many thousands of acres now in good pastures there were covered with stunted scrub.

"We are fortunate here," he said, "in enjoying a wonderful climate and a prolific rainfall. That certainly has helped us and continues to help us.

HEADING PHOTOGRAPH: The science block, Massey Agricultural College, in which congress sessions were held and exhibits of the development of New Zealand's grassland farming and science and of research institutions were displayed. In the College grounds field husbandry demonstrations of pasture plants and machinery used in sowing and renovating pastures drew large between-sessions attendances.

In this country we live by grass and if we can increase its growth on the farm we increase our national prosperity.

"I know that some of the grassland methods we use in New Zealand are not applicable to all countries, but the principles propounded by Mr. Cockayne and expanded by Sir Bruce Levy can, I suggest, be applied anywhere. I would imagine that the primary ones are, first, to build up the fertility of the soil; secondly, to select and improve the pasture plants most useful in turning that fertility to good account; and then to have a policy of utilisation that will give the best returns."

The history of the use of natural grassland through the ages, said Sir Willoughby, was essentially one of exploitation, under which there was no science and little art, with the result that grassland was almost always struggling, and often failing, to survive. Associated with the consequent deterioration was a steady increase in the world's population of people and grazing animals. In more recent years there had been a realisation that grassland warranted some consideration if it were to survive and produce. Out of this had come the science of grassland farming, a science that was one of the youngest.

"Swift said that whoever could make two blades of grass grow where only one grew before 'would deserve better of mankind and do more essential service to his country than the whole race of politicians put together'. But I wonder what Swift would have said of those people who can now produce several blades of grass instead of one, and, moreover, blades of much better quality."

Grassland science had made great strides in many parts of the world, but the desert and semi-desert areas, the extremely cold areas, and the vast areas of good but unimproved natural grassland still stood as a challenge to the scientist whose concern was their improvement. It had to be remembered, too, that science itself would not improve grassland. The results of the scientists' work had to be carried to those practising the art of grassland farming. Grassland progress throughout the world depended partly on the scientist and partly on the adviser, but very largely on the practitioner, concluded his Excellency, in wishing those from overseas a happy and profitable time in New Zealand and trusting that their deliberations would be crowned with success.

## Prime Minister's Welcome

The importance the Government attached to the congress was expressed by the Prime Minister, Mr. Holland, who said he wished to acknowledge the debt people of town and country owed to science for the expansion in primary production that had made possible the expansion of manufacturing industry in New Zealand. If people did not realise the value of grass there would be no progress, but because of the care taken of grassland New Zealand could look forward with confidence. Great progress had been made in the past century. Manufacturing had expanded and all the materials imported were paid for from the proceeds of exports which came almost entirely from the farmers. Last year production from grass-fed animals was worth £320 million.

"If we stop growing grass on the land, the grass will be growing in the streets, but there is no danger of that," said Mr. Holland. Much of the land that had been out of bounds to wheeled implements, yet was rich in prospects, had been brought into use by engineers who had designed special equipment to load and spread fertiliser from aircraft.

In the last 55 years, said Mr. Holland, the area in pasture had increased by 7 per cent., but its carrying capacity had increased by 90 per cent. for dairy

**▼ The Governor-General, Sir Willoughby Norrie (right) and Lady Norrie chat with Dr. William Davies (U.K.) and Sir Bruce Levy (N.Z.) after the ceremony at which the University of New Zealand conferred an honorary doctorate of science on Dr. Davies and the Royal Agricultural Society of New Zealand honoured Sir Bruce and Mr. A. H. Cockayne with bronze medallions and honorary life membership. Sir Bruce was formerly Director of the Grasslands Division of the Department of Scientific and Industrial Research and Mr. Cockayne was formerly Director-General of the Department of Agriculture. Dr. Davies was at the then Grasslands Research Station, Palmerston North, in 1929-31.**

cattle and 75 per cent. for sheep. In 1949-55 the cattle population had increased by 1,000,000 and the sheep population by more than 7,000,000.

Science had been a great influence in attainment of these increases, he said, but one should not forget the hard-working farmers and their wives of earlier times who had none of the modern equipment to help them and yet had done so much.

## New Zealand Grassland Association

A welcome on behalf of the New Zealand Grassland Association, which the Government had nominated as the host for the congress, was extended by Professor J. W. Calder, president of the association. A great honour had been conferred on New Zealand in 1952 when the Sixth Congress had selected this country as the venue of the 1956 congress, he said. The New Zealand association was formed in 1931 with, as its first president, Mr. A. H. Cockayne, who 40 years ago had pioneered the thinking and research work on grassland.

## Chairman's Address

Sir Bruce Levy referred to the deep honour it was to him as chairman to represent the organising committee on such an auspicious grassland occasion and to welcome so many of the world's leading lights on grassland lore and fame.

Mr. A. H. Cockayne (left) reminisces with the Prime Minister, Mr. Holland, after he had been honoured for his work in the promotion of grassland improvement.

The New Zealand Government had liberally financed the congress, placed its specialist staffs and facilities at the disposal of the organising and working committees, and generously named the New Zealand Grassland Association as host body. Major sections of the farming industry had contributed liberal monetary grants as a token of what world grassland research has meant to the farming industry of New Zealand. "Aesthetically we could not have done better than accept the magnificent setting and facilities of Massey Agricultural College granted by the University of New Zealand for our deliberations," he said.

International organisations frequently arose from the inspirations of one or a few, said Sir Bruce, in tracing the rise of the International Grassland Congress. Four men in Europe visited one another in rotation in different countries to discuss grassland problems and techniques in pasture experimentation. In 1927 two of these, Dr. A. Elofson of Uppsala, Sweden, and Professor A. Falke of

Sir Bruce Levy (extreme left) discusses with delegates the field husbandry exhibit in which a wide range of local and overseas strains of the major pasture species were grown in plots and as single plants. On Sir Bruce's left are H. R. Albrecht (U.S.), G. Julen (Sweden), J. Grossman (Brazil), M. S. Motta (Jamaica), M. L. 't Hart (Netherlands), J. Rebischung (France), D. C. Smith (U.S.), H. E. Annett (N.Z.), N. B. Basnyat (Nepal), A. Jantti (Finland), and H. Wexelsen (Norway).

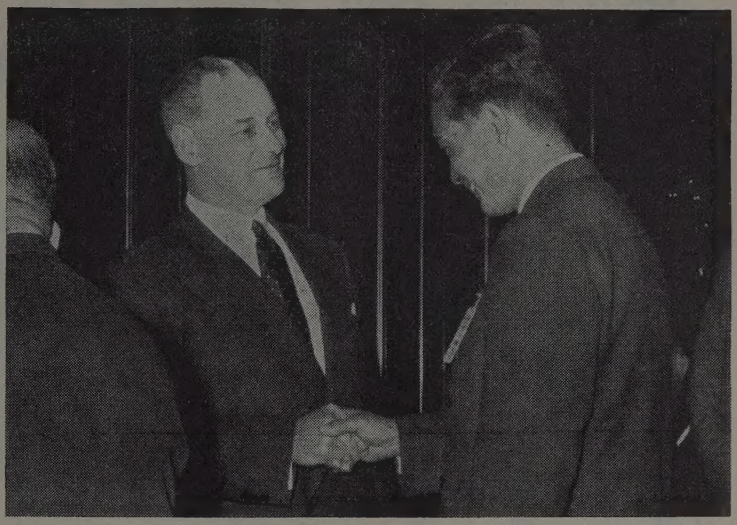
Leipzig, Germany, took the initiative and the First Grassland Congress was held that year at Leipzig. In 1934 at the Third Grassland Congress in Switzerland it was decided to widen the scope of the congress to an international basis, the Fourth Grassland Congress in Britain in 1937 being truly international in character.

It must be a source of great delight to Dr. Elofson and maybe to the late Professor Falke, said Sir Bruce, to see their initial efforts at grassland co-operation spread to this land at the uttermost outpost of the earth.

"From U.S.A., the seat of the Sixth International Grassland Congress, greetings were sent to Dr. Elofson, and perhaps this congress will not forget its still living founder and Dr. F. T. Wahlen of Zurich, who, with his Swiss colleagues, did much to raise the European Grassland Congress to international status.

**"We are gathered here at head of nation level, at head of State level, at University level, at the highest agricultural level, and at world scientific level to honour world grasslands themselves, and this is not too great an honour to bestow upon the grasslands of the world. They stand 'twixt a world of plenty and a world of famine; between a land surface of green oases and a land of desert; between surface soil stability and accelerated erosion," said Sir Bruce.**

It had taken two major wars to show man's dependence on agriculture and to place the science and practice of food production on a plane equal in importance to mechanical industry, the professions, and other equally honourable and important walks of life. Food production came nigh to being the limiting factor in human progress. It was a major duty of such an exalted gathering to see that the food supply of the world more than keeps pace with the human demand or on a plane equal and fair to all humanity.



The Deputy Prime Minister and Minister of Agriculture, Mr. K. J. Holyoake, greets F. Momma (Japan) at the State reception to congress visitors.

"Many of you have come a long way to attend this congress and to see our grasslands and scientific institutions related to research in grasslands and in the conversion of grass to animal products," continued Sir Bruce. "It may be unkind, perhaps unfair, to some of you from hard ecological climates and habitats to view the New Zealand pasture scene, but we would like to think there are at least some fundamental principles in the production and utilisation of grass that will be of very great interest if not of very great benefit to you."

The whole of our grassland fabric was based, said Sir Bruce, on the simple symbiotic phenomenon that stock needs grass and grass needs stock. In the absence or sparseness of each both the grass and the stock were poor, but in the abundance of both, grass and stock thrived.

"I would not hestitate to say New Zealand provides a clearer picture of the interdependence of minerals, clovers, grasses, and stock than any other country of the world. If you get this symbiotic relationship well into your system I have no hesitation in saying you will have gained something to help pattern your own grassland economy on a sound ecological basis. You cannot take our climate with you, but you can take lessons that a favourable grassland climate reveals and how that symbiosis of climate, minerals, clovers, grasses, and stock works and co-operates.

"In the best of our tussock grasslands you may see a vegetation delicately poised in equilibrium with its harder environment and you may see the disastrous results of pressing that unstable association too far. You may see just how far these areas may be improved and rendered more stable and more attuned to the grazing animal, and in this also there may be

The Director-General of Agriculture and leader of the New Zealand delegation, Mr. E. J. Fawcett (right), and a member of the Australian delegation, Mr. A. J. Anderson.

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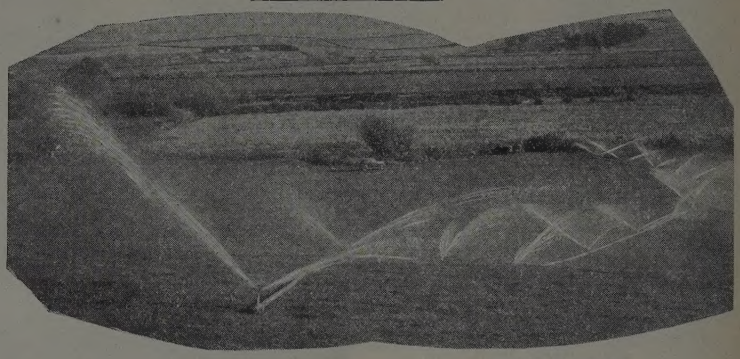

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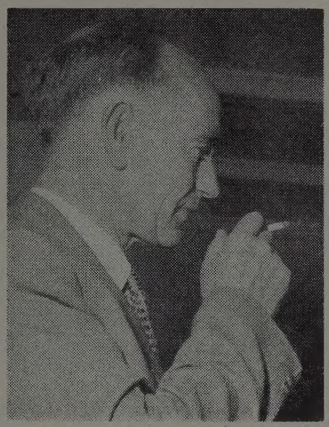
Dr. W. M. Hamilton, first chairman of the organising committee of the congress.



Dr. J. Melville, second chairman of the organising committee.

Professor J. W. Calder, president of the New Zealand Grassland Association, host for the congress.

lessons of value to the harder habitat areas of the world.

"You will be interested to study the land form of New Zealand and no doubt there will be many prophecies of disaster. You will perhaps see evidences of former periods of accelerated erosion in our hill complex of ridges and gullies, and in the river-built plains, with rivers that have in the past transported large quantities of soil and rock to build those river plains. It will be interesting to get your confirmation or doubts and misgivings that this surface veneer of turf and its roots will prove adequate to ward off a renewed cycle of accelerated erosion now that the forest is gone. You may even go back assured that just so long as the grass turf is architecturally constructed and efficiently graze-managed it will prove adequate to preserve the land surface for all time."

There might be some techniques in the researches, some genes in the stud clovers, stud grasses, and even stud stock of this favoured land, said Sir Bruce, that might aid at least certain countries just a little hard in climate to give greater growth vigour and production than their European prototypes growing in a climate too hard to allow new genes to develop and express themselves.

"I feel confident, however," Sir Bruce concluded, "of a few things you will enjoy here. You will enjoy many of our transitions from forest, fern, and scrub to grass. You will wonder at and acclaim the masses of stock our improved grasslands can support. You will see our many further potentialities. You will feel the kindly warmth of our sunshine and perhaps experience the gentle rains that are the life stream of the turf. In addition you may feel the warmth of our hospitality and the regard New Zealand has for all nations on the earth."

# Grassland Workers Honoured

"The Senate of the University of New Zealand wishes to honour world grasslands by conferring honour on one who has spent his lifetime in a wide international field," said the chairman, Sir Bruce Levy, in introducing the Chancellor of the Senate (Sir David Smith) at the official opening of the congress during which Dr. William Davies, Director of the British Grasslands Research Institute, Hurley, Berkshire, was presented by the Vice-Chancellor, Dr. G. A. Currie, for the degree of Doctor of Science honoris causa.

"We are proud to be able to extend an honour to a fellow-member of the British Commonwealth," said Dr. Currie in his laureation address, "although at this international gathering we emphasise more the international character of science and take pride in the fact that the sciences underlying greater production in agriculture, to which all the members of the congress are dedicated, give service to all mankind."

From 1923 to 1928 Dr. Davies was at the Welsh Plant Breeding Station, Aberystwyth. From 1929 to 1931 he was at the Grasslands Research Station at Palmerston North. From 1931 to 1933 as Empire grassland investigator for the Empire Marketing Board he carried out extensive grassland investigations abroad. From 1933 to 1940 he was again at Aberystwyth. From 1940 to 1945 he was Assistant Director of the Grassland Improvement Station, England, and in 1946 took up his present position of Director at Hurley.

Dr. Davies, Sir Bruce Levy, and Mr. A. H. Cockayne had conferred on them at the same ceremony the highest honours of the Royal Agricultural Society of New Zealand, the bronze medallion and honorary life membership, presentation of the medals and scrolls being made by the Governor-General, Sir Willoughby Norrie.

Mr. L. J. Wild, Pro-Chancellor of the University and acting for the president of the society, referred to the three men as standing out above all others in service to agriculture. "Cockayne first ploughed the ground and worked the soil. Davies and Levy sowed the seed and watered the growing crop." It was for his early researches and encouragement given to young workers that the society wished to honour Mr. Cockayne, the distinguished son of a distinguished father (the late Dr. Leonard Cockayne). Mr. Cockayne was among the first, if not the first, to recognise grass as a crop and was the founder of grassland science in New Zealand.

Sir Bruce Levy was reared on a farm and had spent his whole life with farmers. He had almost bludgeoned the farming community, to its own great gain, into adopting his principles, said Mr. Wild.

In acknowledging the honours, Mr. Cockayne said, "All three of us feel that it is honouring the grasslands of New Zealand—the pastures, the livestock, and the grassland farmers on whom New Zealand's prosperity depends—and will also act as an incentive to young workers in the field."

# 1960 Congress in United Kingdom

The invitation to hold the Eighth International Grassland Congress in 1960 in the United Kingdom was accepted at a business session of the Seventh Congress. Dr. William Davies, leader of the United Kingdom delegation, said that the United Kingdom Government was not only prepared to hold the congress, but would put all its resources at the disposal of the organisation. His invitation had the official backing of the British Grassland Association and the Society for Animal Production. The Vice-Chancellor of Reading University had offered all facilities and he was sure other universities throughout Britain would do the same. As Director of the Grassland Research Institute at Hurley he was sure of the co-operation of fellow-directors of other research institutions.

The belief that the United States would heartily support the nomination of the United Kingdom was expressed by Dr. W. M. Myers, leader of the United States delegation to the congress. It was 23 years since the congress had been held in Britain, whose grassland research workers were acknowledged leaders.

Professor C. M. Donald (Australia) said Australian workers were looking forward to the next occasion when the congress could be held in the Southern Hemisphere, but he supported the nomination of Great Britain as the next venue.

A plea for tropical grassland to receive more consideration from the congress was made by Mr. M. S. Motta (Jamaica). "We in the tropics feel that we have somehow been left out," he said. The grassland potentialities of the tropics were tremendous and his Government would be very glad to have the congress there in 1964. Tremendous soil erosion had upset the economy of the country, but there was an upsurge and drive in the tropics to introduce grass as a permanent crop and to integrate soil, animals, grass, and crops. A build-up of interest in grassland problems was wanted to bring the land back to production.

That the Eighth Congress (in 1960) should consider holding the Ninth Congress 4 years later in South America was suggested by Professor J. Grossman (Brazil). South America was a huge continent fairly unknown to other peoples and Brazil was the largest nation there, with a wide variety of ecological conditions. Brazil had the potential to increase livestock production many times over. Visitors would not see as much or as good research work as in New Zealand, as pastoral development was very recent in Brazil, but the Brazilian Government and farmers' organisations would consider it a special privilege to be hosts to the congress.

In supporting the holding of the Ninth Congress in Latin America Mr. R. A. Peterson (representing the Interamerican Institute of Agricultural Sciences) said that pastoral farming and animal production were key industries in Latin America, where the holding of the congress would furnish an impulse to grassland improvement.

The encouragement that the holding of the Ninth Congress in India would give to the tackling of the huge grassland problems in that country was mentioned by the Indian delegate, Mr. P. M. Dabadghao, in presenting his country for consideration by the next congress as the venue of the 1964 congress.

A helicopter used to spray weeds on hill country in a demonstration of aerial agricultural work specially arranged for congress visitors. The fence at left centre is of light materials for aerial dropping on hill country.

### "Proceedings of Congress"

THE programme of the congress with titles of papers and names of speakers was published in the October "Journal". The "Proceedings" to be published will include discussions on papers and reports and other information relevant to the congress. Orders for copies of the "Proceedings" other than those issued to participants should be placed early with the Organising Secretary, Seventh International Grassland Congress, Box 1500, Wellington, New Zealand.

## Special Tropical Conferences

Some definite action by the congress in regard to the problems of tropical countries was urged by Dr. J. P. Botha (South Africa). Scientists concerned with tropical and sub-tropical grasslands should be afforded some better opportunity of meeting to discuss their peculiar problems, he said. He was supported by Mr. K. B. Addison (Southern Rhodesia) and Dr. William Davies (U.K.) and a resolution asking the Food and Agriculture Organization of United Nations to investigate the possibility of holding biennial tropical and sub-tropical conferences was carried.

## Permanent Secretariat

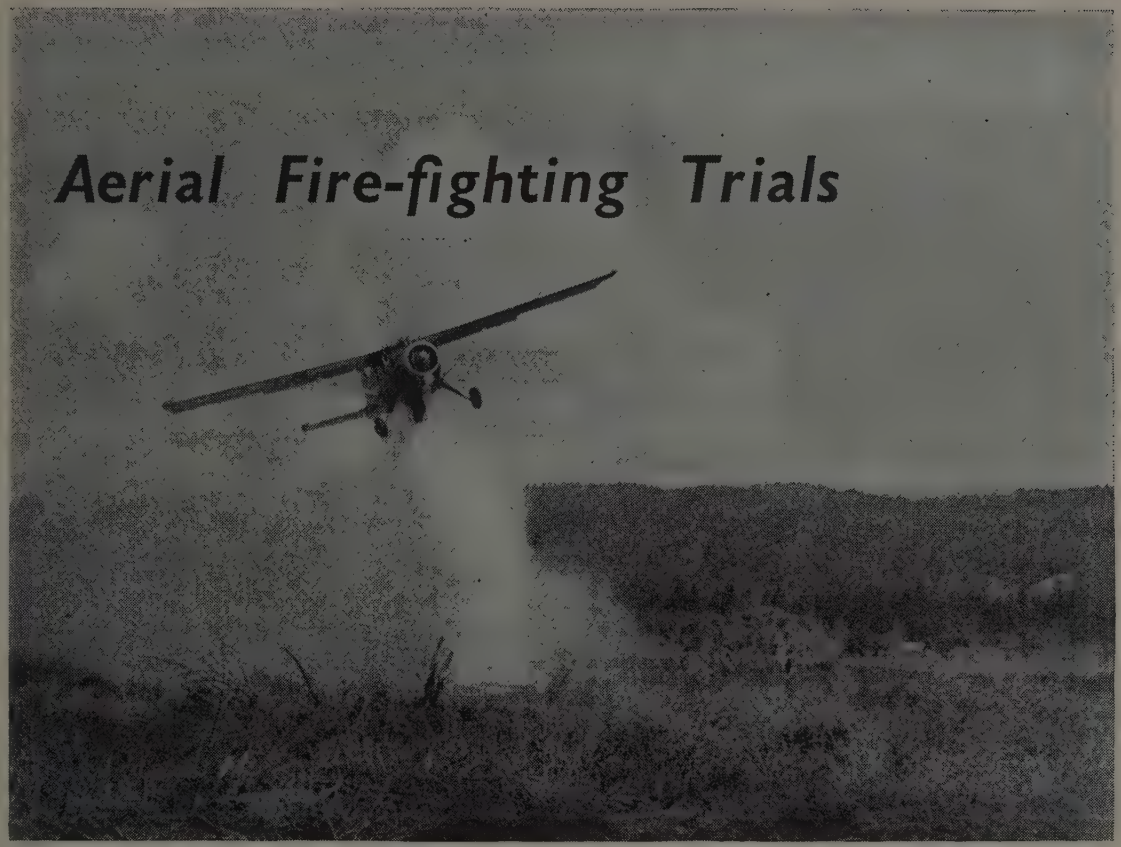
An interim committee comprising Dr. T. M. Stevenson (Canada), Dr. A. Jantti (Finland), and Dr. W. M. Myers (U.S.A.) was set up to investigate and report to the Eighth Congress on the desirability of establishing a permanent secretariat to give continuity to the activities of the organisation.

## Lists and Exchange of Plant Varieties

A resolution was carried asking that FAO give special attention to compiling up-to-date lists of plant varieties, facilitate the international exchange of plant material, and establish centres where such material could be studied. It was moved by Professor C. M. Donald (Australia) and supported by Dr. R. O. Whyte (FAO).

—*G.J.N.*

# Aerial Fire-fighting Trials



By D. A. CAMPBELL,
Superintendent of Soil Conservation, Department of Agriculture Wellington

The effect of instantaneous delivery of a large quantity of water on a scrub fire is overwhelming.

AERIAL fire-fighting trials organised by the Soil Conservation and Rivers Control Council and carried out by the James Aviation Company and the Aircraft Engineering Company at Rotorua and Rongotai respectively are as promising as the aerial topdressing and aerial fencing trials were at a comparable stage of development. Two hundred gallons of water is "bombed" at a fire in 2 seconds, compared with a delivery of 6¼ gallons per second from a big fire engine. This instantaneous effect of 100 gallons delivered per second on the target is overwhelming and can be delivered as frequently as the number of aircraft in the organisation permits and its intensity varied according to the height flown.

THE need for modernising fire-fighting methods in country areas arose from the restrictions placed on the burning of tussock grasslands and scrub lands by the Soil Conservation Act and the Forest and Rural Fires Act. To conserve soil and water more protective, absorptive, and erosion-resistant vegetative cover is essential on farmed and unfarmed land, but such cover creates an increasing fire hazard, which must be matched by developing modern control techniques.

The potentialities of aircraft have been confirmed by their efficacy in mechanising hill country farming; aerial topdressing, seeding, weed spraying, fence dropping, and rabbit poisoning have revolutionised it and laid the foundations of a conservation farming system. The fleet of over 300 agricultural aircraft fitted with hoppers to distribute fertiliser constituted a potential quick-acting aerial fire brigade if techniques were developed for effective dropping of water on tussock, scrub, and even forest fires.

Accordingly the author prepared proposals for trials in August 1955 and these were supported by the Soil Conservation and Rivers Control Council's Advisory Committee on Agricultural Aviation. The council made a grant to finance investigative and development trials.

## Rongotai Trials

Arrangements were made with the Aircraft Engineering Company to use a Tiger Moth aircraft fitted with a spray tank and jettison equipment for the preliminary trials. The first runs to determine the pattern and density of spread in relation to the height flown revealed that the slipstream had a paramount influence on spread, even when the water was jettisoned. Several flights at heights of 15ft. to 50ft. were made across 2 rows of 15 rain gauges 5ft. apart. Though the rain gauges proved unsatisfactory, owing to the angle at which the "rain" fell, they did confirm the pattern of spread seen on a thoroughly saturated strip of grass some 20ft. wide and 200ft. long.

## AERIAL FIRE-FIGHTING TRIALS

The inverted geyser of water created by the jettisoning of 200 gallons in 2 seconds.

When the pattern and density of application had been determined straw spread generously on a strip 12ft. wide and 20yds. long and ignited was used to simulate tussock fires. In successive trial flights across the fire the flames were replaced by a cloud of steam in the 22ft. wide strip on which water was dropped from the aircraft. Except where there were dense heaps of straw the fire was put out, but it rekindled slowly from the dense heaps which were not thoroughly wetted by the light "rain" from the aircraft. The rate of application of water was estimated at 400 gallons per acre, so that this light application of the equivalent of 1/56in. of rain was effective on a simulated tussock fire.

This information indicated the potentialities of a new practical method of attacking tussock fires and further field trials on tussock grassland and trials with scrub and simulated forest fires were arranged.

### Rotorua Trials

In support of this programme the Soil Conservation Council approved of the expenditure of a further £250 to cover the cost of a more advanced trial in collaboration with the James Aviation Company at Rotorua on 21 November 1956. The company was prepared to adapt the fertiliser hoppers of 3 Beaver aircraft for rapid jettisoning of water in a manner calculated to be suitable for fighting fires likely to occur in scrub and in cut-over forests.

A fire area (50yds. x 12yds.) was created by burning bales of hay and heaps of light branches saturated with diesel fuel on the edge of a rubbish tip. The first flight made at 40ft. above this flaming mass completely doused the flames and, except along one edge, replaced them with a cloud of steam. The second plane doused this flaming edge 1 minute later, and the third dropped its load on the reviving flames created by the diesel fuel and embers of the logs. This quick, continuous attack was most effective and impressive, and was marred only by the fact that one aircraft had to be withdrawn owing to leakage from the hopper.

The next target area, of 1 square chain, consisted of several heaps of dead branches about 3ft. high sprayed with diesel fuel. The first flight doused a swath very effectively through the fire area and the second enlarged the swath. Unfortunately another aircraft had to be withdrawn owing to faulty sealing of the hopper. As a result the embers on the under side of the small logs rekindled in the longer interval between water-spraying flights (6 minutes).

Standard rain gauges were placed at intervals through the fire area and four water-bombing flights were made over rain gauges at heights ranging from 30ft. to 150ft. to define the pattern of water spread.

The jettisoning of 200 gallons of water from the aircraft at heights of from 20ft. to 50ft. in 2 to 3 seconds creates an advancing curtain of water most of which is spread and dissipated into large "raindrops" which fall in a swath that saturates clothing and burning material over a width of about 22ft. to 33ft., according to the height from which it is released.

The release of this volume of water in such a short time creates the effect of a rapidly moving inverted geyser with its characteristic "shots" or "bolts" of water interspersed with the dissipated "raindrops". The result is a curtain of water.

At the lowest height the bolts of water not completely dissipated struck with force sufficient to overturn rain gauges set in the pumice sand and to scour holes 4in. deep in the sand. The rate of discharge in 2 seconds from an aircraft flying at 100 m.p.h. was such that water was spread over an area 1/3 chain wide and 2 chains long.

The heaviest density of application was naturally in the middle of the swath, but the over-all rate of application was equivalent to 0.15in. of rain, which was undoubtedly very effective in extinguishing a scrub fire. However, it was not sufficient to douse the embers on the under sides of thick branches, though burning was reduced to smouldering.

Rain gauge measurements showed the width of spread to vary according to the height flown (from 22ft. to over 50ft. at altitudes ranging from 25ft. to 150ft). Owing to the 45 degree angle at which the driving "rain" fell, the rain gauges recorded only about half of the total fall.

### Evaluation

Senior officers of the New Zealand Forest Service and several private forest companies in the area saw the trials and were impressed with the potentialities of using aircraft in fire fighting. Further trials and collaboration between the Soil Conservation Council, Forest Service, catchment boards, the aviation industry, and Civil Aviation Administration should indicate the possibilities of using this new technique.

There are millions of acres of fire-prone tussock grassland in the South Island and large exotic forests in the centre of the North Island that are subject to disastrous fire damage and where ground fire control has presented problems which the use of aircraft could answer.

## Proceedings of Weed Control Conference

PROCEEDINGS of the 9th New Zealand Weed Control Conference, held at Timaru in July 1956, are now available.

The publication gives much up-to-date information on weed control problems in New Zealand, including papers on the difficult-to-kill weeds hawthorn, barberry, and sweet brier.

New uses of chemicals as crop desiccants for lucerne and red clover seed production, the scope of chemicals for soil sterilisation, and the new grass-killing chemicals and their uses for weed control in lucerne and brassica crops are described.

The publication can be obtained for 15s. a copy from the secretary, Weed Control Conference, P.O. Box 1500, Wellington.

Those interested are invited to join the society that organises the conference, the New Zealand Weed Control Conference (Inc.). The annual subscription of 15s. will procure a copy of the Proceedings. The society has the support of the Department of Agriculture.

# Aphid Control in Brassica Crops in Canterbury

THOUGH marked improvement in pasture production and utilisation techniques has reduced materially the need for special supplementary fodder cropping, especially in the more favourable grass-growing regions, the fodder crop remains an essential feature on many farms and in many districts throughout New Zealand. In addition to their general role in providing feed to offset seasonal pasture production shortages or to provide for such special purposes as topping off lambs or flushing the ewe flock, fodder crops are not infrequently important in land development projects and in crop-rotation programmes planned to build up, restore, or maintain soil fertility. Over 850,000 acres of root and green fodder crops are grown annually, by far the greatest part consisting of members of the brassica family—swedes, turnips, rape, chou moellier, and kale—which aggregates about 800,000 acres. Unfortunately, however, brassicas are subject to serious damage by aphids. This article by the Extension Division, Department of Agriculture, discusses some aspects of the occurrence and control of aphids in Canterbury, where attacks were severe and widespread during the warm summer and autumn last year.

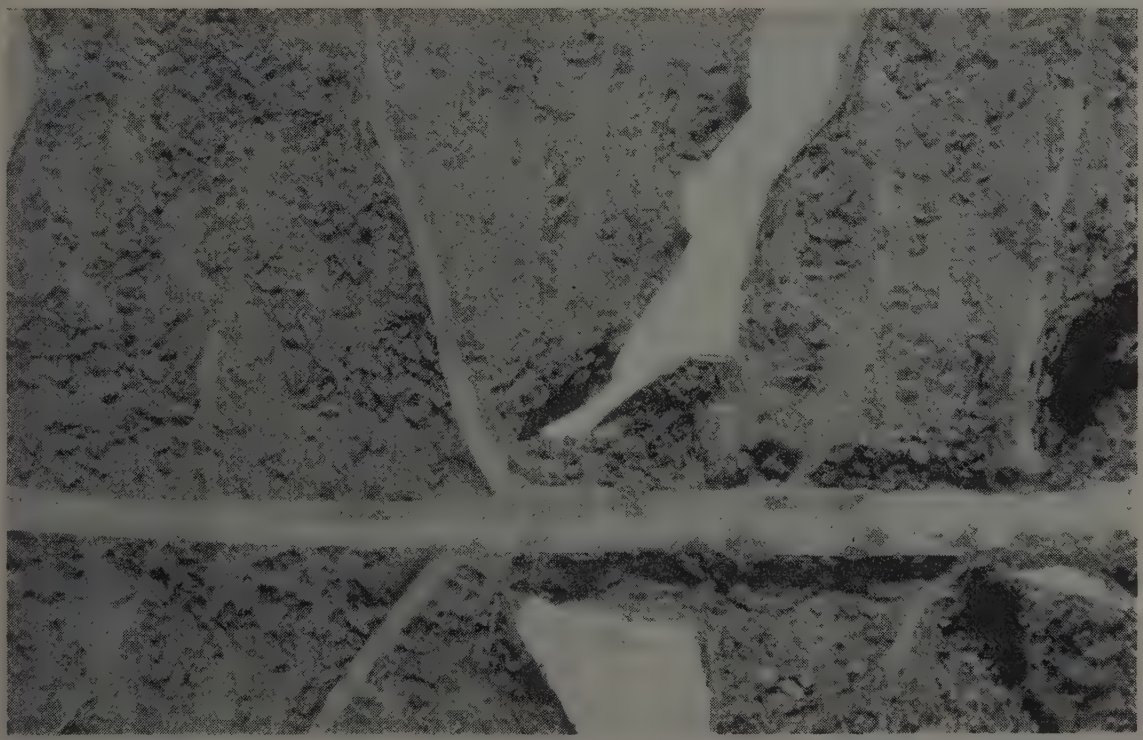
NOTWITHSTANDING their popularity, brassicas are prone to a number of serious diseases and the ravages of insect pests that either alone or in combination often seriously affect crop yields, the quality of the fodder produced, or both. Among the most troublesome of these pests are aphids. These fast-multiplying, sap-sucking insects are particularly partial to swedes, turnips, and rape and are also troublesome on chou moellier and kale.

Unfortunately, aphids are capable of playing the dual role of insect ravager and disease carrier. Their sap sucking deprives infested plants of vital nutrients, and the activities of these insects and the severity of their attacks are proportional to the warmth and dryness of the season. The hotter and drier the season is the more rapid the build-up and spread of aphid populations will be and the greater will be the frequency of new generations. This adds to the struggle for survival of plants already debilitated by semi-drought or drought conditions.

## Virus Disease

Even when aphids themselves do not materially and directly affect the growth and yield of the crops they infest, their role as disease carriers can ultimately affect crop production, even to the extent of the crop becoming a total loss. This happened all too frequently with many turnip crops in Canterbury during the drought season of 1955-56, when an aphid-transmitted virus disease (cauliflower mosaic) spread rapidly throughout individual crops and from crop to crop during late autumn. Even when aphid infestations were comparatively light and crops had bulked up reasonably well the development and spread of the virus resulted in the decay of infected roots to such an extent that by June many crops retained not more than 30 per cent. of sound roots. Some crops were ruined.

Many swede crops were also affected by virus, though in most instances less severely than turnips. With swedes



Unless control measures are begun early, aphid populations quickly build up to serious proportions.

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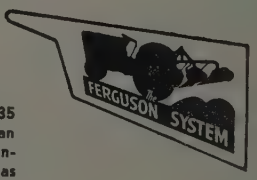


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the direct depletion of plants and stunting of growth by aphid attack were relatively more injurious than any subsequent development of cauliflower mosaic infection.

Though the incidence of cauliflower mosaic on turnip and swede crops had not previously been so severe or so widespread throughout Canterbury as it proved in the autumn of 1956, the incidence and depredation of aphids on these crops appear to have been steadily achieving more serious proportions in recent years, especially in dry seasons such as 1954-55 and 1955-56. In some cases severe infection of turnip crops with mosaic could be attributed to transmission of the disease by aphids from neighbouring infected swede crops.

Chou moellier fodder crops were not seriously affected either by aphids or mosaic, though ill thrift in some crops was probably due mostly to aphids or mosaic infections or to both. Crops showing relatively severe aphid infestation recovered reasonably well when conditions again became favourable for growth. Rape crops suffered both from dry weather and from the activities of aphids. This species of brassica is particularly vulnerable to aphid attack, the insects smothering the foliage and stems of plants during the dry summer period, with consequent stunting of plant growth and failure of many crops.

## Control of Aphids

Measures to combat aphid infestation of field crops have met with varying success. Unfortunately the problem is not the simple one of merely killing most of the insect population on plants at the time of treatment. Even if all the pests are destroyed, the crop is not necessarily rendered immune or even safe from further attack, as winged aphids from outside sources can readily re-infest a crop, and if the weather is favourable, vast new populations can build up rapidly within a week or two.

If the weather remains favourable to aphid development for long, control treatment must be begun early—before insect populations have time to build up—and repeated frequently if worthwhile control is to be attained. There is a general tendency to delay the first treatment until too late, when the cost of repeat treatments is relatively high in relation to the economic value of, though not necessarily the need for, fodder crops.

Control with insecticides applied as sprays or dusts is not always obtained easily because:—

(a) Aphids often shelter in the less accessible under sides of plant foliage.

(b) It is difficult to obtain complete coverage and kills, and the infestation from surviving insects rapidly builds up to serious proportions.

(c) Reinfestation by winged aphids from outside sources can readily occur even when a complete kill has been obtained by the original treatment.

(d) Aphids are not susceptible to some forms of insecticides, such as DDT, that prove successful against many other types of crop and pasture pests.

Even a relatively few winged aphids can effect rapid and widespread distribution of virus disease. The past season, when aphid infestations and mosaic virus disease in brassica crops were exceptionally severe and more widespread than previously in Canterbury, offered an excellent opportunity of observing the nature and incidence of aphid attack and the results and various problems associated with control measures in the field.

The following summarises the observations of Department of Agriculture Instructors in Canterbury:—

## Fodder Crops

Swedes, especially in South Canterbury, and rape and turnips, throughout Canterbury, were severely infested by aphids during the autumn of 1956. Though it is difficult to apportion the extent of damage attributable to insect infestation on the one hand and disease and the exceptionally prolonged spell of dry weather on the other, there can be no doubt that all three factors were complementary and each was materially responsible for the failure of very many crops.

It was also apparent that aphid infestations were largely, if not solely, responsible for the widespread incidence of mosaic virus disease, which occurred with unprecedented severity in both swede and turnip crops and which in many districts wiped out early-sown crops of turnips.

Rape crops were very severely attacked by aphids and many crops failed before the incidence of mosaic in swede and turnip crops became apparent. Though chou moellier crops in places were heavily infested with aphids, they suffered less severely than rape, turnips, or swedes and recovered more readily when favourable growth conditions returned. Some ill thrift in a few chou moellier crops may have been attributable to cauliflower mosaic.

### Varietal Susceptibility

There were some notable differences in varietal susceptibility to aphids, especially among swede varieties. This crop as a class suffered less and recovered better than rape or turnips. Swedes also suffered much less than turnips from the subsequent ill effects of mosaic virus.

The swede varieties N.Z. Wilhelmsburger, N.Z. Sensation, and N.Z. Calder when grown alone proved fairly resistant to aphid attack and recovered satisfactorily after treatment with insecticide. They suffered just as severely as more susceptible varieties when grown in association with them. N.Z. Superlative, N.Z. Grandmaster, and N.Z. Crimson King proved very susceptible and most crops of these varieties suffered severely.

In mixed crops of chou moellier and swedes, aphids attacking the swedes were more difficult to control because of the protection afforded by the taller-growing chou moellier. The sowing of rape with turnips also appeared to encourage insect infestation.

However, one or two observations suggest that the inclusion of non-susceptible species, such as Italian ryegrass or a light seeding of oats when brassicas are sown, may not only afford some alternative feed in the event of brassica failure, but may protect the brassica crop to some extent from aphids.

Factors such as dry weather and disease which checked crop growth also made crops more prone to and less able to withstand or recover from aphid attacks. In soils that dried out badly swedes grown on the flat were reasonably successful compared with those grown on ridges.

There appeared to be little if any evidence of differences in varietal resistance among turnip varieties, either to aphids or to mosaic virus; all were highly susceptible to the pest and the disease. However, early-sown (December) crops were much more severely affected by virus than later-sown (February-March) crops. Late January to February sowings of N.Z. Green Globe or February sowings of N.Z. York Globe produced sounder roots than the earlier sowings of the yellow-fleshed varieties.

## Seed Crops

In addition to brassica crops grown specially for fodder, several thousand acres of brassicas, mainly rape and chou moellier, are grown each year for seed production. In such crops aphids are always likely to be most troublesome and were particularly so last season. Seed crops frequently show a moderate infestation of aphids in spring in the early flowering stage. This arises from overwintering aphids, though, unfortunately, not necessarily aphids overwintering on the brassica crop on which the infestations appear. It is quite possible that at least some of these early infestations arise from aphids that have overwintered on the residues of rape, turnip, and chou moellier fodder crops.

Autumn and spring infestations on seed crops are normally light, but later attacks, from late flowering onward, are usually much more severe. It is these late infestations that normally affect seed yields.

## APHID CONTROL IN BRASSICAS IN CANTERBURY . . .

The development of heavy aphid populations at a time when the crop is in flower and at a period when other plants either within the crop or in surrounding fields are also normally flowering creates a difficult control problem. Bees attracted to crop flowers or any other flowers in the vicinity are just as likely to be affected by insecticidal treatment as the pest. Lindane, the insecticide recommended for aphid control, is also lethal to bees, as spraying of some brassica seed crops in flower has indicated all too clearly.

### Control Measures

The control of aphids in brassica fodder and seed crops was attempted in 1956 with varying success. Measures were largely based on spraying or dusting with the insecticides lindane and parathion. Parathion proved more efficient than lindane in the initial kill of aphids and any other insects, beneficial or harmful, but owing to the weather at the time, re-infestation of crops occurred just as readily whether all aphids were eliminated from the treated area by the first treatment or not.

Parathion, because of its very poisonous properties, has to be handled much more cautiously than lindane. Generally, ground applications (as applied to fodder crops) proved more efficient than aerial applications (as applied to both fodder and seed crops, especially where ground equipment was adapted to spraying the under sides of plant foliage. This disparity in efficiency was doubtless due to differences in efficiency of spray or dust coverage.

Complete coverage and adequate penetration of insecticides to all sites of aphid infestation are particularly difficult to achieve in the tall growth of seed crops, where aerial application is the only practical method of applying sprays or dusts.

Even where reasonable control was achieved by one application reinfestations were often so rapid that a single treatment proved virtually useless. On the other hand, in some instances, though complete control was not obtained and resultant seed yields were low, there would have been little likelihood of harvesting any seed if sprays had not been applied.

Even when two applications were made control was not always achieved because of further reinfestations and the continuation of unfavourable growth conditions, which retarded crop recovery.

For seed crops it would appear advisable if there are any signs of autumn or early spring infestations, to spray in early spring to control overwintering insects, though such action will not necessarily prevent heavy infestations at the late flowering stage. These late infestations can be sprayed only after all signs of flowering in the crop and surrounding fields have ceased.

**Sprays poisonous to bees should never be applied when there is any sign of flower colour.**

Spraying of fodder crops should be begun while infestation is still light. There is always a tendency to delay treatment until the aphid population has built up to the stage where it is conspicuous.

A repeat spraying after an interval of a fortnight to 3 weeks will be necessary if the weather is favourable to aphid development and unfavourable to vigorous plant growth.

**Interval between Spraying and Feeding off**

Stock should not be allowed on fodder crops for at least 3 weeks after any spray has been applied.

In districts where aphid attacks are normally severe the more resistant varieties of swedes should be grown. On the more fertile soils the less susceptible brassicas—chou moellier or kale—could be substituted for winter swedes and turnips and on dairying land crops such as fodder beet, which is less troubled by insect pests or diseases, could be grown.

No turnip variety appears to be very resistant to aphids or to mosaic virus, but later planting, though producing lighter crops, is a safe method of reducing damage in seasons when aphids are likely to be bad. Green Globe and York Globe varieties should be used for these late January or February sowings.

During the current season trial work is being carried out with systemic insecticides reputed to be effective against aphids but not poisonous to bees and with materials repellant to bees.

The Department of Scientific and Industrial Research is also continuing research on another important aspect, the breeding of aphid-resistant varieties.

### *Warning*

THE spray materials mentioned in this article are highly toxic to honey bees and other beneficial pollinating insects. Though the treatment of non-flowering crops is not likely to have any serious harmful effect on these insects, operators must nevertheless exercise the utmost care to prevent spray or dust drift on to neighbouring crops or pastures, particularly those in the flowering stage, or on to hives of honey bees in the vicinity of the area being treated. Before any control measures are undertaken the local instructor of the Extension Division of the Department of Agriculture should be consulted.

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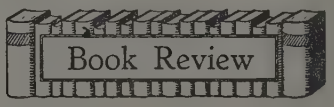


## "The Wheat Industry in Australia": A. R. Callaghan and A. J. Millington

THIS book is not just another publication on how to grow wheat; were it so, it would hold little of interest to the New Zealand farmer. In it the authors have attempted to describe in some detail the whys and the wherefores of the practices which have developed in wheat growing in Australia.

The cultivation of wheat by the dry farming method is criticised: "The lessons from the hundred years of 'dry farming' experience in Australia have been learnt at the expense of loss in soil structure and soil fertility." Some of the principles advocated are already recognised in New Zealand: "The over-riding need in the red brown earth soils is for a suitable soil-building pasture legume. . . ."

To one with a knowledge of wheat growing in New Zealand the problems as outlined by the authors which have faced the wheat industry in Australia are almost incomprehensible. It appears more remarkable when it is realised that Australia, with average yields in the vicinity of 20 bushels, today supplies New Zealand, whose average yield is nearer 40 bushels, with three-quarters of her wheat.

The book is well illustrated and should supply information and food for thought to the potential band of wheat growers in New Zealand.

—*J.H.C.*

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# Proper Use of Wine Finings

**WINEMAKERS generally use one, sometimes two, fining agents for all the varied circumstances in which a wine needs clarifying before it is racked, filtered, or bottled. A better understanding of the different actions of finings would enable winemakers to do away with some of the multiplicity of methods they at present use in the preparation of finings. In this article B. B. Carrodus, formerly Assistant Viticulturist, Department of Agriculture's Te Kauwhata Horticultural Station, explains the particular uses of different finings, their preparation, and action on the wine.**

THE matter which interferes with the condition of a wine and makes it go dull is nearly always in the colloidal state; that is, the particles are too big to be dissolved and too small for the effect of gravity to overcome the repulsion of the like electric charges the particles carry. To make the particles large enough to settle, this electric charge must be neutralised with an equal quantity of the opposite charge, or the nature of the particles changed so they will flocculate. The former action is attributed to bentonite, a colloidal clay with positively charged particles. Gelatine, on the other hand, reacts with the tannin, colouring matter, and alcohol of the wine, as well as having adsorption effects. The reaction causes a precipitation which in settling enmeshes particles of suspended matter and clears the wine. The essential point in preparing finings is that the material should be in such condition that it can be mixed readily throughout the whole body of the wine so that all the wine is sufficiently fined and no part is overfined.

Quite apart from this action of removing suspended particles, fining helps to "marry" a blend and will often pull a young wine into shape. This is particularly true of finings which react chemically with wine, such as gelatine. This class of finings may be used to reduce coarseness due to pressings or stalkiness, etc., and can be termed corrective finings in this use.

It is false economy to buy an inferior line of finings at a lower price. Particular care must be exercised in the choice of isinglass and milk because of "off" taints, and of bentonite, active carbon, and calcium carbonate because of metal contamination. It should be possible to obtain samples from the merchants so that trials can be carried out.

## Choice and Preparation of Finings

Before the finings to be used are selected a decision must be made on exactly what is required: Is it simply the removal of suspended particles, with as little change in the wine as possible, or, in addition, is some change in the constitution of the wine desired? Albuminous finings, for example, remove tannin as well as colouring matter in red wines. Therefore, in the use of these finings, unless it is desired to reduce the tannin content, extra tannin must be added. Experimental evidence indicates that gelatine reacts with added tannin before it does with natural grape tannin.

As nearly all finings react either chemically or electrically with wine (isinglass is said to be the exception), it is essential to have finings well mixed **in water.** (If the finings were prepared by mixing with a small quantity of wine instead of water, the necessary reaction would occur prematurely and its clarifying efficiency would be reduced.) This is then added directly to the bulk of the wine which is agitated vigorously to ensure even fining action throughout the liquid. If this is not done, or if the finings is added to a smaller lot of wine before being added to the bulk, the wine which first comes in contact with the finings will be overfined and the remainder underfined.

To ascertain the amount of finings required by a wine it is convenient to have a standard solution made up, so that a certain volume added to a given volume of the wine is equivalent to 1oz. per 100 gallons. A series of these solutions at different strengths should be tried, and the minimum amount of finings required ascertained. This is not as important with smaller lots, but it does obviate wastage in overfining on the one hand and loss of time in underfining on the other. A convenient standard solution is 1.25 per cent.; that is, 1.25 grammes of finings made up to 100 millilitres with water One millilitre of this in 200 millilitres of wine is equivalent to 1oz. per 100 gallons. As these quantities require accurate measurement and most cellars do not have some of the necessary equipment, it would be best if a local chemist were to make up the solutions for the winemaker.

## Fining Agents

### Bentonite

Bentonite is a colloidal clay of which the best grades are imported from Wyoming, United States of America. The granulated specimens are easier to handle and mix than the powdered ones. The best method of mixing is to add the bentonite slowly to hot water, stirring it briskly. The prepared finings should be smooth and free from lumps. The usual quantity required is 4oz. to 8oz. per 100 gallons. The deposit formed is not very compact, is very light, and clogs filter pads badly. Very little colour is removed from wine with this finings, but stability is not as good as it could be.

It is an excellent finings for cleaning up young wines at the second racking, but is not as good for use as a pre-bottling finings. Its action is almost entirely electric. Occasionally wines do not respond at all to bentonite finings. This is because the suspended particles have a positive charge instead of the usual negative charge. As bentonite is also positively charged, no flocculation occurs. This trouble is most likely to occur in an old dry red wine. Addition of a negatively charged substance, such as casein, solves the problem.

### Kaolin, Spanish Earth, and Gypsum

Kaolin, Spanish earth, and gypsum are sometimes used as finings. Kaolin is not an efficient fining agent. Gypsum, a hydrated calcium sulphate, is used to increase the acid reaction of wines deficient in acidity. In Spain powdered gypsum is added to the crushed grapes used for sherry to obtain a sound fermentation from the low-acid juice. The acidity of New Zealand grapes is generally adequate.

### Isinglass

Isinglass is the dried air-bladder of certain species of fish. The best grade is Penang leaf and should be semi-translucent, light in colour, and nearly odourless. Shredded or granulated samples, though easier to handle, are not as good as the whole leaf, as much of the fibrous structure has been destroyed. Isinglass should always be stored in a cool, dry place.

When the finings are being prepared the leaf should be soaked for 24 hours in cold acidulated water; citric acid is suitable. After draining, it should be soaked for 24 hours in some of the wine to be fined. The leaf at this stage should be almost transparent and very soft. It should then be broken up as much as possible and stirred vigorously, then strained carefully to remove the "skeg" and strained again through linen. The finings should not be forced through the strainer, or difficulty may be experienced in settling the finings. The

deposit formed is compact but very light and lifts at the slightest current.

The action of isinglass is purely physical if cold liquids have been used in its preparation, as the fibrous structure of the organ is not destroyed and forms a network which enmeshes particles as it settles in the wine. Hot water dissolves these fibres, and then the isinglass will be no more efficient than ordinary gelatine. Though it is more trouble to prepare, this is the best finings for delicate white wines, where it is not desired to take anything out of the wine. The usual range necessary is ¼oz. to ½oz. per 100 gallons. Wine should not be left on isinglass longer than is necessary, as isinglass is liable to putrefy.

**Gelatine**

Gelatine is a product of meat works and is prepared from bones, hooves, skin, etc., of young animals, particularly calves. It can be obtained very pure and in a very convenient form for use. It reacts with tannin, colouring matter, and alcohol in wine, though not significantly with the last named.

To avoid stripping tannin from the wine a weight of pure white tannin equal to that of the gelatine used is added to the wine some 12 to 24 hours beforehand. The gelatine is soaked in cold water for 12 hours, in which time it swells considerably. It should then be dissolved in hot water and added directly to the wine, being stirred briskly all the time.

Gelatine is an excellent all-purpose finings and gives considerable stability to wines treated with it. It gives a firm, small deposit from which it is easy to filter. It is advisable to use so-called "pure white grape tannin"; if red tannin is used, considerably more is required per unit of gelatine. With red wines low in colouring matter this finings is inclined to take out too much colour. Usual rates are 2oz. to 4oz. per 100 gallons.

**Casein**

Casein is prepared from skimmed milk and has uses in winemaking as a very vigorous finings. The fining action mainly results from the coagulation of the casein by the wine acids. There is very little reaction with tannin and other components of the wine. It is principally a white wine finings and can be used to reduce coarseness. Unless it has been pretreated, casein will not dissolve in water, but it dissolves readily in ammonia. The solution is then boiled until there is no further smell of ammonia coming off.

Fresh skimmed milk, if free from taints, is an excellent and vigorous finings, especially where it is desirable to remove coarseness from a wine. If used as a corrective finings, it can be followed immediately with a heavy bentonite finings to accelerate precipitation, and the wine can be racked off as soon as possible. This is for two reasons—milk and casein are liable to putrefy, and if the wine is left on the lees, the coarseness which the milk was selected to remove re-enters the wine. Casein at 4oz. per 100 gallons and skimmed milk at 1 gallon per 100 gallons are fairly good finings. Milk is the classical finings for sherry.

**Egg White**

Egg white, or egg albumen, is a very good and vigorous finings, particularly for dry red wines. However, only very high-quality wines justify the expense of this finings. The whites of the eggs are separated very carefully from the yolks, well beaten, and diluted with water. They are then added to the wines, being agitated briskly. Not much colour is removed with egg white, but a considerable amount of tannin is removed. It is necessary to use 1½oz. of tannin per ounce of albumen, unless it is desired to remove tannin from the wine. Four to eight eggs per 100 gallons is the average rate of use. This is equivalent to 1oz. of dried egg albumen.

**Lime or Calcium Carbonate**

Lime or calcium carbonate is sometimes used to reduce acidity in wines. Ten ounces of lime per 100 gallons of wine neutralises 1 gramme per litre of tartaric acid. It is an undesirable addition in that it adsorbs essential oils and esters, taking the flavour out of the wine.

**Active Carbon**

Active carbon may be used for one of two purposes: First, to remove "off" taints, when it is used at 2oz. to 4oz. per 100 gallons; secondly, to remove colour from a red wine or musts, when it is used at 5lb. to 10lb. per 100 gallons. Its use cannot be recommended in quality wines.

**Pectin**

Pectin splitting enzymes are being tried overseas on white musts before fermentation, but there is no agreement yet on whether the increased handling and cost are made up in increased quality or yield.

## Other Finings

There is a group of fining agents not permitted by law in New Zealand, though they are permitted in certain other winemaking countries. Among them is the moeslinger, or "blue" finings, in which potassium ferrocyanide reacts with metals, oxidases, and wine colloids. This confers very great stability on the wine and is the only known method for certain removal of iron and copper. However, there is a very real risk to the health of the consumer if the finings is used by any but a competent chemist who can be certain that the wine is not overfined. Fresh blood is another finings which the law regards as constituting a health risk.

To summarise, the cardinal points in fining wine are: Select the right finings for the job; buy the top grade finings; prepare the finings properly and carefully; mix the finings with the wine well and thoroughly; do not leave wine on finings longer than is necessary.

## Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during November and for the 4 months ended 30 November 1956, with comparative figures for the same month and 4 months of 1955, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

**BUTTER**

| Period | Creamery (tons) | Whey (tons) | Total (tons) | Percentage Inc. or dec. |
|---|---|---|---|---|
| November 1956 | 24,315 | 395 | 24,710 | — |
| November 1955 | 24,925 | 441 | 25,366 | — |
| Increase or decrease | —610 | —46 | —656 | —2.586 |
| 4 months ended 30/11/56 | 72,761 | 1,158 | 73,919 | — |
| 4 months ended 30/11/55 | 73,783 | 1,230 | 75,013 | — |
| Increase or decrease | —1,022 | —72 | —1,094 | —1.458 |

Butter in store at 30 November 1956 was 8,717 tons

**CHEESE**

| Period | White (tons) | Coloured (tons) | Total (tons) | Percentage Inc. or dec. |
|---|---|---|---|---|
| November 1956 | 9,728 | 1,914 | 11,642 | — |
| November 1955 | 12,307 | 2,097 | 14,404 | — |
| Increase or decrease | —2,579 | —183 | —2,762 | —19.175 |
| 4 months ended 30/11/56 | 27,510 | 4,012 | 31,522 | — |
| 4 months ended 30/11/55 | 29,990 | 4,131 | 34,121 | — |
| Increase or decrease | —2,480 | —119 | —2,599 | —7.617 |

Cheese in store at 30 November 1956 was 16,806 tons

If these figures are converted into butterfat equivalent, there is a decrease of 2.506 per cent. in butterfat graded for the 4 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

A farmer's trees hauled out ready for the sawmiller.

*Trees on the Farm*

# Economics of Farm Woodlots

**WHEN discussing the benefits of trees on the farm, land owners often ask: "But what do I get out of it?" This article by W. H. Jolliffe, Extension Forestry Officer, New Zealand Forest Service, endeavours to answer this question. In general terms the answer can be quickly given: "Shelter for home and stock, beautification, prevention of or cure for erosion, provision of firewood, fencing material, timber for a host of purposes, and lastly timber for sale as standing trees or as a sawn product."**

THE question is not nearly so easy to answer in terms of money. A price cannot be put on increased home comfort caused by shelter or on added attractiveness caused by well-chosen trees, though both these attributes may make the property a much more saleable proposition. The prevention or cure of erosion may make the difference between developing a successful farm and abandoning a hopeless proposition.

Some attempt has been made in other countries at evaluating the benefit to stock and crops of well-planned shelter. Under difficult conditions of drought and windiness yields of hay and pasture have been found to be between two and four times greater in sheltered areas than in unsheltered ones. The **average** improvement due to shelter has shown a yield of 20 to 60 per cent. (depending on the kind of crop) over that from where there is no shelter. A little calculation will soon turn these percentages into money returns and will also show what proportion of a farm can be devoted to trees with productivity still being maintained at a high level.

## Material for the Farm

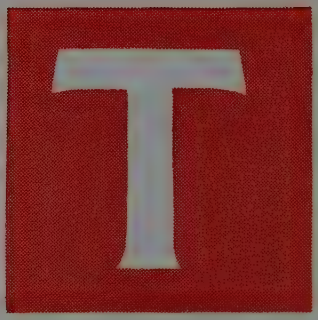
Wood is necessary on any farm for firewood, posts and other fencing material, and timber for gates, for new structures, and for the repair of old ones. Requirements will vary from farm to farm and from one locality to another, but in an endeavour to give some illustrative figures a hypothetical case has been built up from some known facts.

From a survey made by the Department of Agriculture of 67 farms in the Wairarapa the average number of paddocks and their average size were obtained for farms in that district. From these data it was calculated that the average sheep farm would require at least about 4000 posts for its original fencing. If it is assumed that the average life of these posts would be 20 years, the annual replacement on such a farm would be 200 posts.

One Wairarapa sheep farm has an excellent woodlot composed of a variety of species of trees. From it the farmer has been getting annually an average of 200 posts, 3 strainers, 750 battens, and 8 cords of firewood. Outside purchase of these items would cost £230. The farmer's actual expenditure is only the £35 necessary for creosote (he has his own plant) and tools. His saving is thus £195. At the end of the 20 years necessary to renew all the posts on his farm he will have saved £3900, provided he has been able to do all the work himself in this time.

Had this farmer employed labour to do the work for him, the actual cost would have been £118. This figure was obtained by charging for time spent on the job at labour rates ruling in 1954 and assuming creosote to have cost 4s. 6d. per gallon. The employment of labour would therefore reduce the saving over 20 years to £2240.

An area of from 4 to 6 acres of radiata pine (varying according to the quality of the site) is all that is necessary to supply the foregoing needs. No



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P.C.7

A young woodlot giving shelter to a hay paddock.

## Publications about Trees on the Farm

"Establishing a Woodlot"—New Zealand Forest Service Information Series No. 18: Deals with planning the woodlot, some legal points, choice of species, preparing the site, protecting the trees, planting, and care after planting. Also gives notes on some suitable species and directions for home growing of young trees.

"Management of Woodlots"—New Zealand Forest Service Information Series No. 19: Deals with pruning, thinning, and protecting woodlots, how to secure the second crop, the economics of farm woodlots, including notes on insurance and taxation, and describes how to measure standing trees.

Both the above are obtainable free from any office of the New Zealand Forest Service.

"Farm Trees and Hedges"—Massey Agricultural College Bulletin No. 12.

This is obtainable from Massey Agricultural College, Palmerston North, or through any bookseller. Price 8s. (including postage).

"The New Zealand Journal of Agriculture"—A series of articles under the general heading "Trees on the Farm" has appeared since March 1955. The following articles have been reprinted as leaflets:—

"Tree Growing on Sand Dunes"; "Farm Forestry Competitions"; "Collection, Extraction, and Storage of Seed"; "Tree Measurement"; "Growing the Plants"; "Farm Forestry Associations".

These are available on application to the New Zealand Forest Service, P.O. Box 894, Wellington.

attempt has been made in this case to assess the woodlot's contribution of timber, as there were no figures on which to base the calculation.

### Trees as a Crop

It is surprising how many farmers cannot think of trees as a crop, but there are many in New Zealand who are now felling trees that they planted and reaping a handsome reward.

Trees may be sold in log form, but more often they are sold standing on the payment by the purchaser of "royalty" or "stumpage". The royalty per 100 board feet may commonly vary between 2s. 6d. and 10s., depending on the size and cleanliness of the trees, on the workability of the country, and on the distance from the consumer market.

A fully stocked stand of radiata pine can, at 40 years of age, commonly yield 60,000 to 90,000 board feet per acre, depending on the site on which it is growing. The gross return could be as low as £75 per acre for poor trees on difficult country a considerable distance from the market, but could be over £400 per acre if the opposite conditions obtained.

# Commercial Tulip

City of Christchurch, one of the best-known New Zealand-raised tulips.

An unnamed variety
One of the many tulips raised by Mr. N. Chamberlain, Ellesmere.

Left—The two blooms on the right are badly infected with "tulip fire". Right—"Striped" tulips may be considered attractive, but are a menace to healthy stock.

# Culture in New Zealand

By K. H. MARCUSSEN,
Horticulturist, Department of Agriculture, Christchurch

THAT Dutch tulip bulbs are of high quality is beyond dispute, but they cannot be grown in New Zealand without being acclimatised. Acclimatisation takes time and is a specialised culture. For general use New Zealand-grown bulbs are therefore superior to those imported from the Northern Hemisphere, and they are grown by the thousands. In this article an account is given of commercial tulip bulb and cut flower production in New Zealand and the particular requirements for tulip culture are discussed.

HOLLAND is the home of modern tulips. They have been grown there for centuries and great development has taken place through research and controlled breeding. The soil and climate of Holland suit tulips and up until the 1920s Dutch bulbs were exported to all parts of the world. They still are, but local competition is now encountered in many countries, both for domestic use and for export. The United States of America and United Kingdom have developed a considerable bulb trade, as have Denmark and other Continental countries. Bulbs are grown in Australia to a limited extent and in New Zealand bulbs have been grown commercially for the last 20 to 30 years.

However, the demand for bulbs in New Zealand is not yet met by local production. In addition Australia provides a ready market for New Zealand-grown bulbs. Some bulbs are exported to U.S.A., where New Zealand bulbs can be brought to flower under glasshouse conditions without special pre-forcing treatment. This particular export offers much scope for those countries in the Southern Hemisphere which can provide a line which Holland cannot offer.

Export of flowers to U.S.A. may even be possible with the air services now available. During the past season a request was received by a commercial grower for a trial consignment, but unfortunately it was too late in the season for the order to be met.

Most tulip stocks in New Zealand are of Dutch origin; either imported direct by the grower or obtained from other bulb producers. Some work has, however, been done in New Zealand on raising new varieties, notably by Mr. N. Chamberlain, Ellesmere. His best-known variety is City of Christchurch, which is reproduced in colour on the opposite page. An unnamed seedling selected at his property last season is also illustrated.

Tulip bulbs are planted by hand and pressed lightly into the furrows.

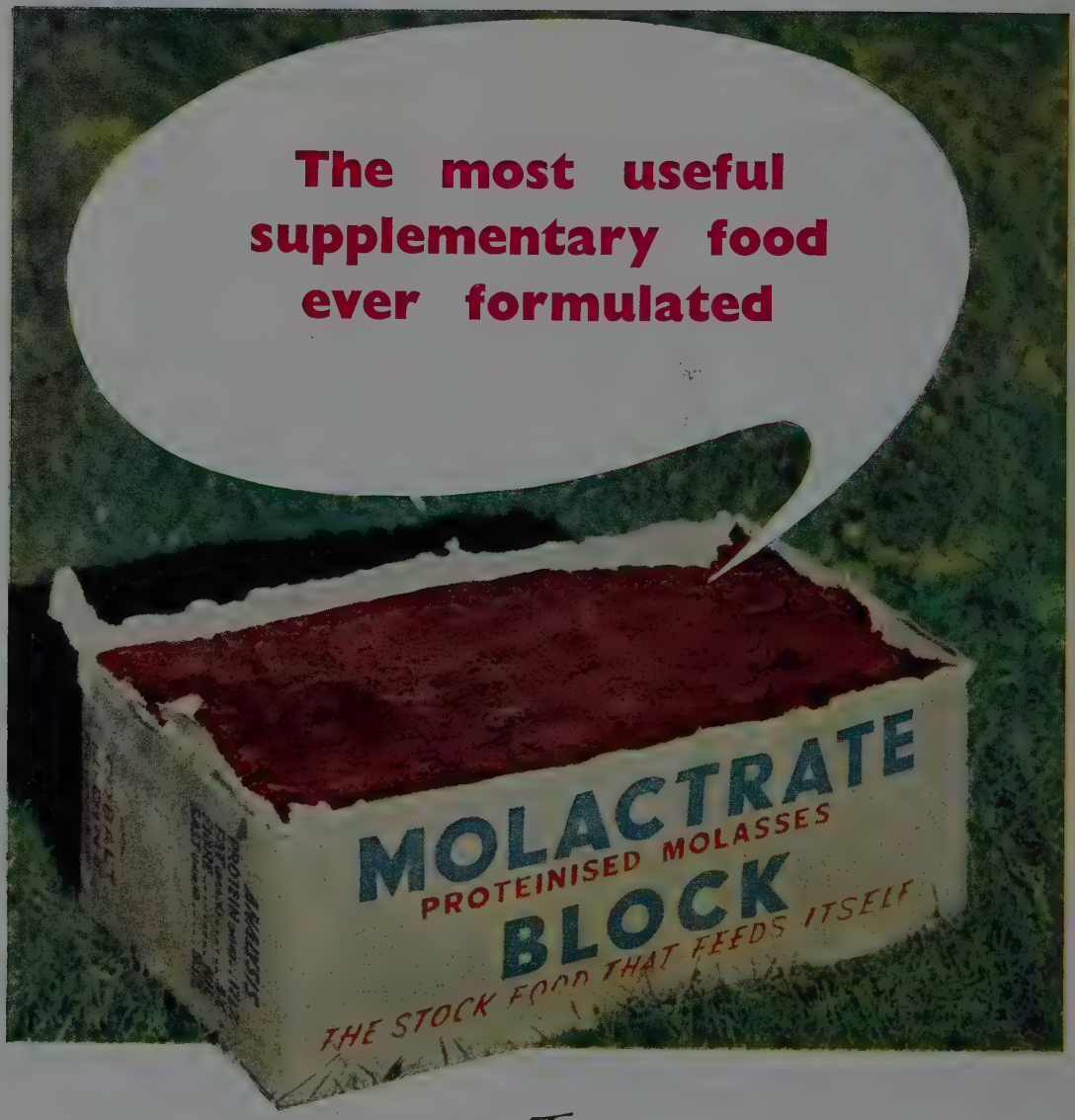
Tulip bulbs do not develop satisfactorily under hot soil temperatures and the most suitable conditions in New Zealand have been found in the South Island. The largest bulb-growing areas are in Canterbury and Otago, and some expansion of the industry is taking place in Southland.

Tulip culture overseas was in the past always considered in two phases: Bulb production and flower production.

The bulb producers would grow bulbs only and remove the flower heads as soon as a line had been rogued and found true to name and virus free.

The flower growers would force under glass and the bulbs would be discarded after use; in fact, on early ones the bulbs would often be split to provide an inch or two more stem.

# The most useful supplementary food ever formulated




*Just put it out in the paddock—*

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**High in protein, rich in sugars, and containing no fibre, MOLACTRATE BLOCK is the most useful food supplement—summer and winter—which is available to the New Zealand farmer . . . for flushing ewes . . . for feeding rams before service . . . for carrying hoggets through the winter . . . and for eliminating 'sleepy sickness' from your flock. Dairyfarmers, too, know its value in wintering cattle. . . . NOW is the time to place forward orders with your Merchant.**

It was considered that too much had gone into the production of the flowers to make it worth while growing the bulbs on.

The same conditions are found to some extent where tulips are grown in the warmer parts of this country, especially if the flowers are cut. When tulips are planted in a hot, dry soil little root development or none takes place and bulbs remain almost as if they were in storage. Instead of the roots forming first, the shoot may grow, drawing nourishment from the bulb only. Flowering that year may not be greatly affected, but bulb development will be unsatisfactory, often resulting in "breaking up of the bulbs"; that is, the formation of a number of small bulbs none of which is of flowering size.

## Soil Requirements and Site

One of the most important requirements for tulip growing is a well-drained soil with a good water-holding capacity. In Holland the tulip fields are mostly a light loam of a sandy nature, with a permanent water-table at a depth of about 2ft. In such a soil tulips can be lifted with a good, clean skin which makes them a more attractive selling line, though the outer skin is not usually an indicator of the quality of the bulb.

Tulips can be grown satisfactorily in most soils provided they have been suitably prepared. A rich soil is not necessary, but a good lime content is essential. Very heavy soils are not desirable, as the lifting of the bulbs would be most difficult, especially under drought conditions which are experienced sometimes at that time of the year.

Crop rotation should be carried out to ensure that no disease is carried over in the soil and also to keep the varieties true to name. Some bulbs will invariably be missed during lifting and would create a problem if the field were used for tulips the following year.

Bulbs are often grown in New Zealand as one of the crops in mixed farming, and provided adequate attention and labour can be given to the bulbs and proper storage facilities are available, this is very satisfactory. It may then be possible not to come back to any particular paddock for 10 years or more, which will ensure that no disease is carried over. Four years should be considered a minimum, if a crop has shown infection of "fire".

The humus content should be as high as possible to counteract erratic rainfall. A grass paddock which has recently been turned in, possibly followed by a well-manured crop of potatoes, would be very suitable.

Little research has been carried out in New Zealand on applications of fertilisers to bulb crops; general practice is to use little or none at all. The lime content of the soil should be good and in most cases a dressing of lime will be beneficial. A neutral soil should be aimed at, and the quantity to apply will depend on the acidity of the soil and past treatment of the land. To ascertain the quantity of fertilisers and lime that should be applied a soil test is necessary. Such tests can be arranged by application to the local horticultural officer of the Department of Agriculture.

Shelter from strong winds is desirable, but an open situation is preferable. If tulips are grown in too sheltered a position, the incidence of pests and diseases will be much higher; "tulip fire", a fungous disease, can be especially troublesome where there is insufficient air movement around the plants during wet and humid weather.

## Planting

Tulips for bulb production should be planted before any growth of the shoots becomes evident. The bulbs are never dormant. While tulip bulbs are in storage growth takes place internally, especially flower development, and for satisfactory growth and multiplication of bulbs they should be planted early enough to establish good roots before top growth becomes visible. Furthermore, to encourage root growth it is important that the soil is moist when planting takes place.

The usual planting time is about the middle of March.

The furrows are best opened by moulders. Tractors can be fitted with twin or triple moulders as are used in potato crops, but great care must be exercised to ensure that the furrows are straight and of uniform depth. The importance of uniform planting will be appreciated when the bulbs are lifted, as they are generally ploughed out.

Occasionally bulbs can be seen growing under the Dutch system; they are planted in beds with 5 or 6 rows some 9in. apart. This method requires much more labour and as most of the work must be carried out by hand, the practice is seldom adopted commercially in this country.

The distance between rows varies among growers and to some extent is dictated by the machinery used; distances up to 27in. between rows are usual.

The most suitable depth for planting has been found to be 4in. to the base of the bulbs.

Bulbs are usually planted individually by hand by pressing them lightly into the bottom of the furrow. The distance between bulbs will vary according to the size of the bulbs. Large bulbs may be 4in. to 6in. apart and the smaller ones may be set as close as 1in. apart.

The grades of any variety should always be planted separately, flowering and non-flowering stock apart. That makes management easier, because only bulbs produced from bulbs that have flowered the previous season should be sold; otherwise they cannot be guaranteed true to name and virus free.

[*Jack Welsh and Sons*

**Planting in beds as practised in Holland is seen occasionally in New Zealand, but requires more hand cultivation.**

Light dressings of fertilisers and lime can be applied before the bulbs are covered. The fertilisers will then be readily available and the lime near the bulbs will assist development of a good outer skin on the new bulbs.

The bulbs are covered by splitting the ridges with the moulder. By moulding the bulbs well up they will not be affected so much by changing atmospheric temperatures and provided the soil is moist at planting time, the moisture will be conserved better. A fairly high ridge will allow better cultivation before the leaves emerge.

## Cultivation

Even if cultivation to eradicate weeds has been carried out before planting, the weed seeds that have been brought near the surface during planting will still germinate. These weeds should be killed before they grow too large, and mechanical cultivation can safely be done two or three times before emergence of the shoots.

# Sturdy independence and friendly co-operation

The farmers' co-operative organisations are members of a great and growing movement. If any proof is necessary, then it is supplied by the fact that the 11 member co-operatives, 87 branches and numerous agents of the Farmers' Co-operatives Movement did more than £53,000,000-worth of business last year.

Farmers' co-operatives originated in New Zealand towards the end of last century in opposition to big overseas marketing companies in order to obtain better and less costly service. From providing buying service, the co-operatives moved to selling as well. By the beginning of World War I, the co-operatives were not only selling farm products but also supplying farmers with many of their necessities, such as fertilisers, hardware, machinery and general merchandise.

In 1917, the Co-operatives formed the Farmers' Co-operative Wholesale Federation (N.Z.) Ltd., to act as a wholesale, indent, liason and service house.

In doing so, the local co-operatives lost none of their identity or individuality. Indeed, they entered wider fields of operation and continued to develop, as they are still doing, according to the special needs of their areas.

This mixture of sturdy independence and friendly co-operation means that today a farmer in one part of the country can obtain information, livestock, seed, produce, grain or any other commodity from any shareholder or client of a co-operative in any other part of the country. It means that thousands of farmers are thriving just that extra bit better than their neighbours because of the strength of the organisation with which they are dealing — their *own* co-operative.

## THE FARMERS' CO-OPERATIVE MOVEMENT in New Zealand

## *embraces*

**NORTH ISLAND**

**Farmers' Co-operative Auctioneering Co. Ltd., Hamilton.**
**Gisborne Sheepfarmers' Frozen Meat and Mercantile Co. Ltd., Gisborne.**
**Hawke's Bay Farmers' Co-operative Assocation Ltd., Hastings.**
**N.Z. Farmers' Co-operative Distributing Co. Ltd., Feilding.**
**North Auckland Farmers' Co-operative Ltd., Whangarei.**
**The Farmers' Co-operative Organisation Society of N.Z. Ltd., Hawera.**

**SOUTH ISLAND**

**Canterbury Farmers' Co-operative Association Ltd., Timaru.**
**N.Z. Farmers' Co-operative Association of Canterbury Ltd., Christchurch.**
**North Otago Farmers' Co-operative Association Ltd., Oamaru.**
**Otago Farmers' Co-operative Association of New Zealand Ltd., Dunedin.**
**Southland Farmers' Co-operative Association Ltd., Invercargill.**

***All these member co-operatives, their branches and agents are linked through The Farmers' Co-operative Wholesale Federation (N.Z.) Ltd., P.O. Box 1124, Wellington.***

FARMERS' CO-OP

**CREATED BY THE FARMER FOR THE FARMER**

Such cultivation can be carried out by partly breaking down the ridges over the bulbs with inverted harrows, followed by remoulding. Once the shoots have grown so long that there is danger of damage to the tips no further cultivation should be done to the tops of the ridges, but inter-row cultivation should be continued.

Care should always be exercised so that the foliage is not damaged; any injury will increase the risk of infection by "tulip fire" and for that reason the final cleaning up between and near to the plants before flowering is best done by hand hoeing.

Inter-row cultivation is often done by tractor, as is shown in the upper illustration on page 27, but some growers use horse-drawn implements, which they consider cause less damage to the foliage.

## Marketing of Cut Flowers

In New Zealand most tulip growers combine bulb production with cut flower marketing. There is a good market for tulips in all the larger centres and air transport makes rapid distribution possible. Prices are generally good and it is doubtful if a similar return could be obtained by deheading the flowers, as is done in Holland, for greater bulb production. In this country tulips can be marketed with a much shorter stem than would be profitable overseas. Though a leaf or two must be cut with the flowers, the plant should never be cut to ground level if bulb production is the aim.

Tulip flowers open during the day, particularly when it is sunny, and close again during the night. Flowers should therefore be cut early in the day. The degree of maturity will depend on the distance to the market or florist. When they can be forwarded in a few hours almost fully mature flowers can be cut, but for longer periods in transit it is better to cut them slightly under-developed. Bunching is generally done while the flowers are being picked; 6 in each bunch of one separate colour and with the blooms at an even level is standard for marketing. The flowers should be placed in water immediately after being picked and left several hours before being packed.

Some growers prefer to pick the flowers a day or two before maturity and keep them in a shed for final development. This will often result in more flowers being cut, as picking can be done over a greater part of the day and will not be hindered so much by wet weather. Furthermore, when tulips have been drawing water for a few days they will stiffen up and travel better.

Flower sheds should be dark and cool to keep the flowers in the best condition. Adequate containers should be available in which the flowers can stand upright and deep in water, which it should be possible to drain off without disturbing the flowers. It is important to keep the flowers standing straight in the troughs; if they are placed in a slanting position, the stems tend to twist to bring the blooms into an upright position.

Flowering of bulbs grown for commercial bulb production at Waimate.

The water should be let out of the troughs a short while before the tulips are packed to allow them to drain off. Light wooden boxes are used for dispatch. These should be lined with non-absorbent paper and the bunches packed firmly, but without being crushed.

## Attention at Flowering

Constant attention should be given to the crop while the tulips are flowering. The quality of the bulbs sent out by a grower will soon become known and strict rogueing is necessary to ensure pure lines. Varieties can become mixed in storage and handling and it is possible to sort them out only when they are flowering. "Striped" tulips infected with virus should be removed.

Only flowers that are clean and true to type should be cut. Diseased and off types should be dug up and destroyed. A garden trowel is satisfactory for this work, especially if it is fitted with a longer handle. It is important to remove all the offsets with the clump, as well as the flowering bulb.

Growers who detect virus by symptoms on the leaves before flowering rogue the plants immediately. This practice is commendable, for the earlier removal of diseased plants will reduce the degree of infection and its spread.

The flowers that have not been cut for marketing should be deheaded at the earliest opportunity to prevent energy going into seed formation and also because flowers readily become infected with "fire" if rain and humid weather should prevail. No use is made of these flowers without stems and because of the danger of fungous disease they are best destroyed as soon as possible.

## Lifting

Usually little attention is paid to the crop between flowering and lifting. The plants should be allowed to die down naturally. The date on which to begin lifting will depend on the amount of rain during the season, but mid-December is the average. If tulips are lifted too early, the skins will not have browned sufficiently and if they are left too long in the ground, the skins will dry up and crack during handling of the bulbs.

The crop is usually ploughed out, a job that can be mastered only through experience, but the value of uniform

# K-16

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***International Grassland Congress, Palmerston North, November 9, 1956.***

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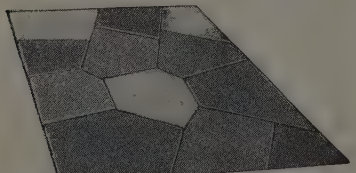

FOR A HIRE CHARGE OF ONLY £6/15/- PER MONTH we will supply you with a complete set of 12 steel forms from which you can cast the blocks for your own individual crazy paving. This hire charge also includes sufficient colouring compound to colour 150 sq. ft. of pavement.
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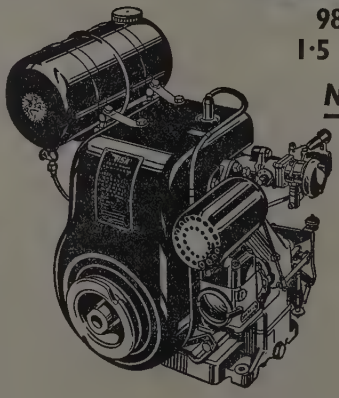

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planting soon becomes obvious. The furrow should be cut so that the bulbs are exposed on the turned soil, from where they are picked up by hand. The bulbs are best placed direct into shallow trays for drying, but this is seldom done. Bulbs are usually placed in sacks for easy transport to the shed. Where this practice is carried out no time should be lost in collecting and emptying the sacks, as the bulbs will soon start sweating, which will spoil their appearance. When bulbs are placed in trays in the field these should be stacked and covered to prevent the sun drying the skins, thus causing them to crack.

In the lifting and subsequent handling of the bulbs name tags should be placed with each lot to prevent varieties becoming mixed. The extra trouble involved will be well worth while. Bulbs that have not yet flowered should be marked.

## Storage, Grading, and Packing

The bulbs should be spread out in the storage shed as soon as possible after they are lifted and not left longer than necessary in the sacks. The layers should be not more than 2in. or 3in. deep or drying will not be uniform. The holding trays should be shallow and light, but of soild construction, and no larger than can be handled easily by one person. Fine wire mesh is best for the bottoms, as it will allow full air movement. The trays can be stacked on top of each other provided adequate space is left between. Trays can be made suitable for stacking by fixing a stout upright in each corner; for a box 3in. deep, the upright should be no less than 6in.

Tulips are best stored at a uniform temperature of 55 to 60 degrees F. with ample ventilation. Such a temperature is very difficult to keep in a New Zealand summer, but the need for it should be kept in mind when sheds are constructed. In Holland stores are insulated against variation in temperatures and equipped with a heating system which is put into operation when required.

Cleaning and grading can begin a few days after lifting. Some growers use various types of mechanical graders; others grade by hand to avoid bruising the bulbs. Grading by hand can be done while the bulbs are being cleaned.

[*Jack Welsh and Sons*

**Labour is cut down by the spacing of rows at the correct distance for mechanical inter-row cultivation.**

[*C. E. Clarke*

**Bulbs spread out in the shed for drying.**

Only bulbs from stock that flowered the previous season should be sold to ensure that the bulbs are true to name and free of virus.

There is no rigid standard for grading bulbs in New Zealand. The largest bulbs are generally kept as mother stock for planting out. It is a good proposition to keep these, as they can be relied on to give good multiplication.

The bulbs that are sold range from 1in. to 2in. in diameter, depending on the amount of planting stock required for the coming season. Bulbs of only 1in. diameter are not a good grade of flowering bulb and are better kept for planting stock.

The smallest bulbs are often discarded except by growers who are building up stock. Anything smaller than ½in. in diameter may take several years to produce good flowering bulbs.

Bulbs are usually sent out during the latter part of January and in February. The same care should be taken in packing as has been exercised while the bulbs were handled in storage. Occasionally bulbs are packed loose in wooden crates and these should then have a layer of wood wool in the bottom and on the top for padding. It is more common to send the bulbs out in stout paper bags with holes punched for ventilation, or in cardboard cartons.

Whichever container is used the bulbs should be packed firmly without being crushed or bruised and each bag should be labelled clearly with the name of the variety.

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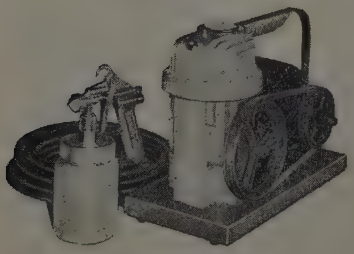

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# RAILWAYS . . .

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Here in New Zealand, too, railways are indispensable wherever traffic is heavy. On average, each mile of railway in New Zealand carries more than a thousand tons of goods each working day . . . efficiently . . . economically.

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## Export

Different regulations govern importation of plant material into various countries and a prospective exporter should obtain from the local Plant Quarantine Officer of the Department of Agriculture information on the latest requirement for the specific country or countries. Some countries may require field inspection of the crop and application should be made early enough for the Plant Quarantine Officer to inspect the crop during flowering.

In all cases an International Health Certificate is required to accompany the consignment.

## Acclimatisation of Imported Bulbs

Because tulip bulbs are never dormant, they cannot be brought from the Northern Hemisphere and immediately fall into step with seasons in New Zealand, which differ by some 5 or 6 months. Their natural routine of growth must be altered and acclimatisation takes 2 growing seasons.

Imports arrive in late spring or early summer and the bulbs should be planted immediately. The bulbs are then expecting their winter season and the coldest possible position should be chosen for planting them. Adequate moisture should be available in the soil to encourage root growth. Immediately after it is planted the plot should be mulched to keep the soil as cool as possible until top growth is well up. Lucerne hay is very suitable for such a mulch.

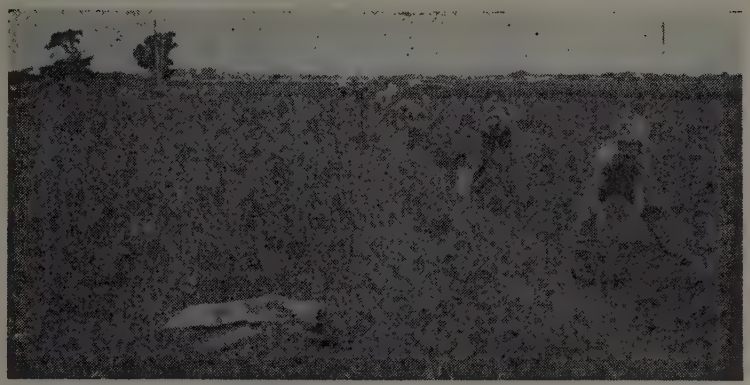
Flowering will take place in late summer and deheading should be done as soon as the flowers have been examined. After flowering the tops should be allowed to die down naturally.

The bulbs will generally break up and produce a number of small ones. Most growers leave them in the original position until they have grown for another season, but some growers prefer to lift them and line them out immediately in a new position, as they consider that better results can be expected because of more growing space and better soil conditions. Both methods have their merits and without research no definite recommendation can be made for the advantage of one method over the other.

## Diseases, Pests, and Disorders

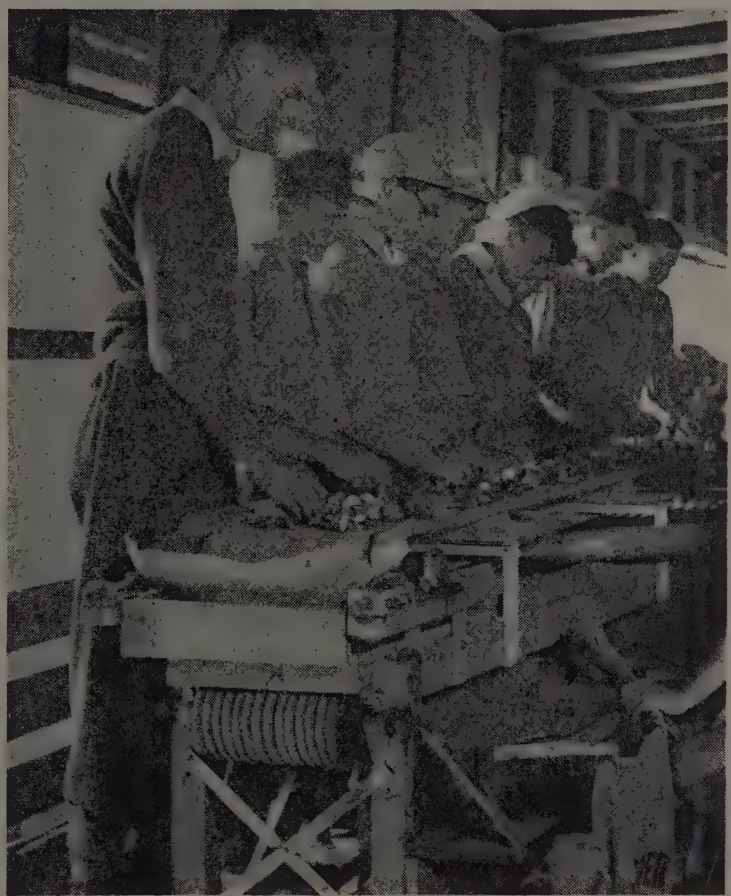
Though the troubles encountered in tulip culture are few, two diseases can be very devastating and must be guarded against. These are "tulip fire" and "tulip break". The latter is caused by a virus and is mainly spread by green fly, which must therefore also be considered serious on tulips.

There is another fungous disease of tulips recorded in New Zealand,



[*O. E. Clarke*

The bulbs are gathered by hand.



[*O. E. Clarke*

Mechanical grading is carried out by some tulip growers.

*Sclerotinia sclerotiorum.* Other *Sclerotinia* species which are troublesome overseas may also be found in this country, though they are not recorded. They cause rot of the bulbs, but these and other diseases of minor importance are generally kept in check by crop rotation and the planting of clean, healthy bulbs only.

Bulb mites (*Rhizoglyphus echinopus*) are at times found in tulips. They are not uncommon pests of bulbs in general and infestation often follows injury to the bulbs caused either mechanically or by diseases.

The bulb mites are minute insects found between the layers of bulb tissue and can be observed in rotted areas when infected bulbs are cut across. Badly infected bulbs, which are soft, should be destroyed by burning; slightly infected bulbs can be treated for 10 minutes in a bath heated to 122 degrees F. before commencement. Addition of nicotine sulphate (40 per cent.) at 1:400 will make this treatment more effective. Such treatment is, however, difficult to carry out and if infection of bulb mites is suspected the local horticultural officer of the Department of Agriculture should be consulted for identification of the pest and advice on treatment.

A disorder known as fasciation is sometimes found in tulips. Instead of producing the normal one flower per stem affected bulbs will develop several blooms on each stem. This disorder is met with in many kinds of plants and may be caused by any one of a number of physiological upsets. In tulips it may be caused by too high a temperature or too dry condition at one stage of development and it appears to be hereditary, as in this country particularly one variety, The Bishop, has been found susceptible. Large bulbs seem to be more likely to produce fasciated stems.

Some work has been done overseas on fostering these multi-flowered tulips, but as the flowers are seldom of even size, or placed at the same level, they have little value for bedding or for florists. In small groups they might appeal because they are unusual.

## Tulip Fire

Tulip fire is a fungous disease caused by *Botrytis tulipae.* It can be carried over in the soil from year to year and spread by the wind from infected plants, especially during wet and cold weather. Because a serious infection can be of considerable economic importance, a knowledge of the life history of the organism and the development and symptoms of infection is valuable so that adequate control measures can be applied.

A tulip bloom attacked by green fly, which can mark and spoil the flowers, as well as spread tulip breaking virus.

The first sign of tulip fire in the field is found about the time the shoots are breaking through the ground. Infected plants will show up as distorted and malformed shoots, generally stunted. The partially opened leaves will show diseased areas, where great numbers of grey spores will develop. This stage is called primary infection and is the time when it may be possible to save a crop. If the weather is suitable and the spores are allowed to spread, the whole crop may become infected and soon show the leaf symptoms which will be described.

All plants showing primary infection should be dug up carefully and placed in a bucket, care being taken that the bulb and surrounding soil are removed and burnt or buried deeply; plant material infected with fire should never be composted.

Inspection of the emerging crop should be carried out every few days to ascertain that all plants showing primary infection are removed as soon as they appear. This will reduce the risk of spread of the infection.

Secondary infection can develop in the leaves, buds, or petals. When spores from primary infections lodge on leaves of healthy tulips the infection may show up as raised lumps or dry, greyish yellow spots. These spots will enlarge and possibly unite, developing blackish areas which contain spores that can spread the disease further. Infected leaves often take on a reddish colour which has given the name fire to the disease. Occasionally the plants will partially collapse.

If flowers become infected in the bud stage, they seldom open; instead the petals tend to collapse and the symptoms described will develop on the leaves.

Infection may also occur when the petals are fully developed and will show up as whitish spots. This type of infection is quite commonly observed after cold and wet weather. To prevent the disease becoming established in the remainder of the plant the flowers can be deheaded immediately, but it will often be found that if fine weather follows, the infection will be checked naturally.

When the foliage is dying the fungus develops a special type of spores called sclerotes. These are small, black, seed-like organisms which are capable of remaining alive in the soil for several years, which is one of the reasons crop rotation of tulips is necessary.

The bulbs may also be affected by the disease and show circular scars when lifted. Sclerotes may be embedded in these scars or lodged inside the brown outer skin of the bulbs. Where infection has been general the bulbs should always be peeled and carefully inspected.

Measures of control in the field, apart from those outlined, include spraying. Spraying with ferbam or thiram at 2lb. actual per 100 gallons of water plus a spreader can prevent the disease. To be fully effective sprays should be applied at intervals of 10 to 14 days throughout the season of top growth. Few growers would be prepared to carry out such a programme, but where a crop has been badly infected the previous year spraying will be well worth while to check any infection that is carried over. Ferbam leaves a black deposit and is unsuitable during flower development.

Deep planting is also a preventive measure, because infected bulbs may rot entirely before the shoot reaches above the ground.

## Tulip Break

Breaking of colour in tulip flowers is caused by virus, and infected plants have no commercial value today. In the past, notably during the 17th century, these tulips were much sought after and sometimes very high prices were paid for such infected bulbs.

The virus will to some extent show up in the foliage with a slight mottling or flecking of paler green, which can sometimes be seen in the stems also. Growth is generally dwarfed and infected plants may flower a little later than healthy ones. Flower breaking takes place in all but white and yellow varieties. Pigments of other colours become affected and form varied

patterns, with the white or yellow showing through.

Virus can be transmitted from plant to plant by various means. The most common vectors are aphids, of which various species are found on tulips, but it can also be spread by anyone working among the plants. When flowers are being cut the movement of the knife from stem to stem can transmit the disease and handling of healthy plants while lifting infected ones is an easy way of spreading the virus.

Once a tulip has been infected with virus it cannot be cured. The virus is carried through the plant in the sap and all bulbs developing from it will be contaminated. Every plant showing virus symptoms should therefore be dug up as soon as observed and during flowering daily inspections should be made. The white and yellow varieties present a problem until leaf symptoms are recognised, but it should be remembered that every single virus-infected plant is a menace to healthy stock.

To prevent spread of virus by aphids measures for their control should be carried out.

## Aphids

Several species of aphids may be found on tulips. Infestations are most general on the flower buds and the foliage in early spring, but severe infestations can also occur on the bulbs during storage, especially when ventilation is poor in the shed.

Tulips are very susceptible to attack by green fly and because they are the main vectors of virus, they should not be tolerated on commercial tulip crops.

Apart from carrying this infection the aphids themselves can damage plant tissues, especially the flowers, which may become distorted or spotted. The damage caused will spoil the quality of the flower and for that reason alone it is well worth carrying out measures of control.

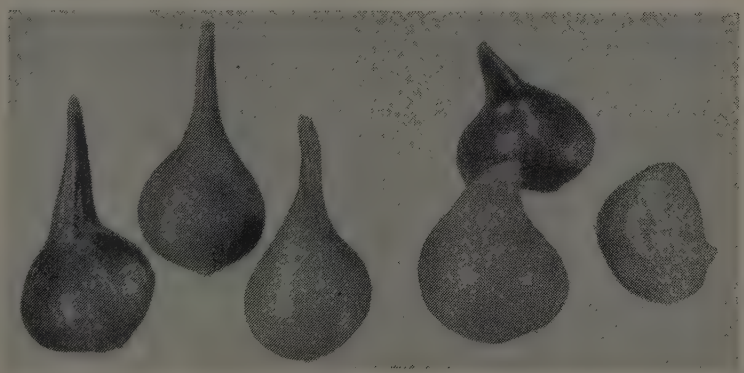
Spraying should be carried out as soon as aphids are noticed on the growing crop, or even as a preventive measure, with one of the persistent sprays that are available now. BHC (lindane) is safe to use before the flowering stage has been reached and if the plants have been sprayed fortnightly up to that stage, they may remain clean while flowering takes place. Harm to bees will be avoided if during flowering, contact spray such as nicotine sulphate is used. HETP or TEPP may be applied in the evening after bees have returned to their hives, as by the following day they will not be dangerous to pollinating insects.

Some growers are now becoming interested in the systemic sprays of the parathion and schradan groups. These highly toxic sprays are absorbed by the plant and remain active for a period in the sap and will kill any sucking insects feeding on the plants.

These spray materials should be handled with very great care according to instructions supplied by the distributors, as they are very toxic to humans as well and can be absorbed through both the skin and the lungs.

If aphids are seen on the bulbs in storage, the shed should be closed up and fumigated. The best material to use for this purpose is probably BHC (lindane), which is available as a smoke generator.

Multi-flowering of tulips is caused by a disorder called fasciation, affected plants bearing more than one flower per stem.



Bulbs with long necks and round bodies, as shown on the left, are produced from non-flowering bulbs. The irregular, flattened shape of the bulbs on the right shows that they are produced from plants that flowered last season. These are likely to be true to name and virus free and are the only bulbs that should be offered for sale.

**Acknowledgment**

Acknowledgment is made to tulip growers for information and assistance given, especially to Mrs. A. Grant, "Craigburn", Waimate.

# Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during February as follows:—

**1XH Hamilton, 12.33 p.m.**

11 February—"Soils and Fertilisers in the Garden", by W. Brandenburg, Horticultural Instructor, Department of Agriculture, Hamilton.

18 February—"Autumn Problems on the Dairy Farm", by J. R. Murray, Instructor in Agriculture, Department of Agriculture, Hamilton.

25 February—"Meat and Wool Matters", by A. W. Moore, Federated Farmers, Hamilton.

**2ZA Palmerston North, 12.33 p.m.**

4 February—"Sheep Fertility", by G. T. Williamson, Veterinarian, Department of Agriculture, Palmerston North.

11 February—"Harvesting Red Clover", by W. B. H. Smith, Instructor in Agriculture, Department of Agriculture, Masterton.

18 February—"Cover Crops", by G. N. Paulin, Horticultural Inspector, Department of Agriculture, Palmerston North.

25 February—"Farm Safety", by J. O. Brasell, Farm Machinery Instructor, Department of Agriculture, Palmerston North.

**3YA Christchurch, 12.20 p.m.**

4 February—"The Importation of Stock Quarantine Regulations", by J. Gibson, Livestock Instructor, Department of Agriculture, Christchurch.

18 February—Review of "The New Zealand Journal of Agriculture", by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

**Regular Sessions**

**1XH Hamilton**, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

**1XN Whangarei**, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 8 p.m. ("News for the Farmer").

**1YA Auckland**, Mondays at 12.33 p.m. Tuesdays, Wednesdays, and Thursdays at 7.45 p.m., and Fridays at 6 p.m. and 7.45 p.m.

**1YZ Rotorua**, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7 p.m. (Bay of Plenty country journal, Pig Council talk on fourth Wednesday of every other month at 12 33 p.m.), Thursdays at 12.33 p.m. (news for the farmer).

**2XA Wanganui**, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

**2XG Gisborne**, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

**2XN Nelson**, Thursdays at 8 p.m.

**2XP New Plymouth**, Thursdays at 8.1 p.m.

**2YA Wellington**, Mondays at 7.15 p.m. Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

**2YZ Napier**, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

**2ZA Palmerston North**, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

**3XC Timaru**, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

**3YA Christchurch**, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

**3YZ Greymouth**, Mondays and Thursdays at 12.33 p.m.

**4YA Dunedin**, Mondays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

**4YZ Invercargill**, Mondays at 12.33 p.m., Tuesdays at 7 p.m.

# Fruit Crop Estimates for 1956-57 Season

THE following estimates made in November of the fruit crop for the 1956-57 season are in 000's of bushel cases. They are summarised from information supplied by field officers of the Horticulture Division of the Department of Agriculture. Districts producing less than 500 bushels of a variety are not shown, but are included in totals. District totals of more than 500 are rounded to the nearest 1000.

| FRUIT | DISTRICT | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Auckland Province except Gisborne | Gisborne | Hawke's Bay | Wellington and Taranaki Provinces | Nelson Province | Marlborough | Canterbury and North Otago | Central Otago | Total 000 bushels |
| **APPLES—** | | | | | | | | | |
| Ballarat | 63 | 5 | 81 | 3 | 10 | 8 | 7 | 1 | 178 |
| Cox's Orange Pippin | 7 | 1 | 70 | 3 | 138 | 13 | 10 | 11 | 253 |
| Delicious | 25 | 4 | 75 | 4 | 218 | 30 | 17 | 55 | 428 |
| Dougherty | 13 | 2 | 63 | — | 35 | 2 | — | — | 115 |
| Granny Smith | 96 | 4 | 110 | 5 | 102 | 3 | 3 | 5 | 328 |
| Gravenstein | 19 | — | 33 | — | 75 | 2 | 1 | 2 | 132 |
| Jonathan | 8 | — | 44 | 2 | 275 | 28 | 18 | 19 | 394 |
| Sturmer | 8 | 8 | 210 | 13 | 399 | 36 | 57 | 37 | 768 |
| Others | 94 | 3 | 162 | 8 | 185 | 20 | 51 | 41 | 564 |
| Total | 333 | 27 | 848 | 38 | 1,437 | 142 | 164 | 171 | 3,160 |
| **PEARS—** | | | | | | | | | |
| Beurre Bosc | 3 | — | 2 | — | 11 | — | — | — | 16 |
| Louise Bonne de Jersey | 1 | — | 18 | — | — | — | — | 1 | 20 |
| Packham's Triumph | 9 | — | 6 | — | 8 | — | — | — | 23 |
| P. Barry | 3 | 1 | 13 | 1 | 6 | — | 2 | — | 25 |
| W. B. Chretien | 13 | — | 60 | — | 58 | — | 5 | 13 | 150 |
| Winter Cole | — | 1 | 51 | 3 | 49 | 1 | 7 | 6 | 117 |
| Winter Nelis | — | 1 | 24 | 1 | 8 | 1 | 2 | 11 | 48 |
| Others | 12 | — | 4 | — | 17 | 1 | 7 | 6 | 47 |
| Total | 40 | 3 | 178 | 5 | 158 | 3 | 23 | 36 | 446 |
| **OTHER FRUITS—** | | | | | | | | | |
| Peaches | 74 | 13 | 313 | 3 | 55 | 8 | 9 | 110 | 585 |
| Apricots | — | 1 | 6 | — | — | — | 19 | 158 | 184 |
| Nectarines | 1 | 1 | 13 | — | 2 | 1 | 3 | 28 | 49 |
| Plums | 45 | 4 | 72 | 1 | 11 | 2 | 16 | 36 | 187 |
| Cherries | — | — | 1 | — | 1 | 3 | 1 | 11 | 17 |
| Quinces | 1 | — | 5 | — | 3 | — | 1 | — | 10 |

# Meteorological Records for December

| Station | Height of station above M.S.L. (ft.) | Air temperatures in degrees (Fahrenheit) | | | | Rainfall in inches | | | | | Bright sunshine hours |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Approx. mean | Difference from normal | Absolute maximum and minimum | | Total fall | No. of days of rain | Difference from normal | Maximum fall | | |
| | | | | Maximum | Minimum | | | | Amount | Date | |
| Kerikeri | 201 | 60.0 | + 0.9 | 75.2 | 38.9 | 5.30 | 18 | + 1.46 | 1.45 | 30 | 199 |
| Auckland | 160 | 62.0 | + 1.6 | 74.3 | 47.9 | 3.15 | 17 | — 0.15 | 0.52 | 26 | 198 |
| Tauranga | 10 | 59.0 | + 0.2 | 74.0 | 38.9 | 3.80 | 18 | + 0.36 | 1.16 | 10 | 220 |
| Ruakura | 131 | 58.0 | + 0.6 | 76.9 | 38.4 | 5.09 | 20 | + 1.41 | 0.99 | 27 | 196 |
| Rotorua | 975 | 57.1 | + 0.3 | 75.8 | 34.7 | 4.89 | 16 | + 0.91 | 1.65 | 10 | 204 |
| Gisborne | 12 | 60.4 | + 1.4 | 76.0 | 42.0 | 2.79 | 19 | + 0.20 | 0.50 | 23 | 206 |
| New Plymouth | 160 | 57.6 | + 0.8 | 74.0 | 44.6 | 10.17 | 17 | + 5.46 | 2.68 | 26 | 224 |
| Karioi | 2125 | 52.2 | + 0.3 | 71.1 | 31.4 | 6.06 | 22 | + 2.20 | 1.16 | 26 | |
| Napier | 5 | 62.4 | + 2.8 | 79.1 | 45.0 | 1.58 | 13 | — 0.51 | 0.38 | 26 | 222 |
| Wanganui | 72 | 59.1 | + 0.9 | 76.8 | 45.5 | 4.26 | 17 | + 1.64 | 0.69 | 12 | 221 |
| Palmerston North | 110 | 59.0 | + 2.1 | 76.8 | 43.5 | 3.26 | 20 | + 0.40 | 0.71 | 6 | 194 |
| Waingawa | 340 | 57.0 | + 0.9 | 78.4 | 37.9 | 3.83 | 20 | + 1.13 | 0.75 | 6 | 209 |
| Wellington | 415 | 57.6 | + 1.8 | 71.2 | 43.4 | 5.28 | 16 | + 1.91 | 1.16 | 7 | 226 |
| Nelson airfield | 5 | 56.4 | + 0.9 | 70.0 | 41.2 | 4.20 | 16 | + 1.47 | 0.96 | 6,10 | 217 |
| Blenheim | 12 | 58.7 | + 1.8 | 78.0 | 39.1 | 2.34 | 13 | + 0.63 | 0.45 | 24 | 235 |
| Hokitika | 15 | 54.6 | + 0.8 | 66.8 | 42.0 | 14.79 | 27 | + 4.86 | 2.61 | 4 | 135 |
| Hanmer | 1270 | 53.8 | + 0.0 | 75.0 | 32.0 | 4.97 | 15 | + 1.49 | 1.35 | 24 | 189 |
| Christchurch | 22 | 57.4 | + 1.1 | 76.5 | 33.6 | 2.78 | 8 | + 0.96 | 1.30 | 5 | 202 |
| Ashburton | 323 | 56.9 | + 1.2 | 76.6 | 31.8 | 4.47 | 10 | + 2.02 | 1.48 | 5 | 170 |
| Timaru | 56 | 57.5 | + 2.0 | 79.8 | 36.2 | 1.29 | 14 | — 0.66 | 0.29 | 5, 28 | 169 |
| Alexandra | 520 | 56.8 | + 0.4 | 79.3 | 32.0 | 3.76 | 13 | + 2.68 | 1.60 | 20 | 154 |
| Taieri | 80 | 54.7 | + 1.3 | 76.8 | 30.3 | 3.52 | 18 | + 1.24 | 0.72 | 30 | 131 |
| Invercargill airfield | 0 | 53.5 | + 1.7 | 71.0 | 29.4 | 4.77 | 20 | + 1.13 | 1.22 | 8 | 155 |
| Chatham Islands | 140 | 53.8 | + 1.8 | 65.0 | 38.0 | 5.95 | 20 | + 3.72 | 1.40 | 19 | |

# Internal Parasites of Poultry

**MANY household poultry keepers have bought young pullets in the past few months to replace birds which are now approaching the end of their laying season. If these new pullets are to thrive and give good winter egg production, they must not be troubled by internal parasites. This article by C. J. Goldsmith, Poultry Instructor, Department of Agriculture, Christchurch, describes the types of worms which infest poultry and which may, unless care is taken, cause trouble among laying birds.**

INTERNAL parasites are often responsible for loss of egg production, retarded growth, and poor condition. They may also reduce resistance to disease and are particularly dangerous to young stock.

## Large Roundworms

The large roundworm is the most common internal parasite in New Zealand. Symptoms of a heavy attack are reduced appetite, paleness in the face and comb, a desire to remain on the perch during the day, diarrhoea (sometimes blood stained), and loose feathers. Laying pullets seldom die because of roundworms, but many sick fowls are found to be heavily infested.

The most common indication of moderate infestation is reduced appetite, nervousness, and loss of weight. Occasionally individual worms may be observed in the droppings. Birds often carry a heavy infestation of these parasites without it being obvious that they are the cause of poor condition and low egg production.

If roundworms are suspected, any fowl which has died naturally should be opened up for a visual examination, or an emaciated or unthrifty cull can be killed for the purpose.

The dead bird should be placed on a flat surface. A few handfuls of feathers should be plucked out round the vent, an incision made in the skin with a pair of sharp scissors or knife, and the skin ripped off for easy visibility. The carcass should then be opened up with the scissors, and the small intestine (the long, looped portion leading from the gizzard) cut at one end and then squeezed between finger and thumb along the entire length. This will evacuate the intestinal contents, which can then be examined.

Roundworms are easily recognised. They are large, thick, creamy white, and often 3in. or 4in. long. They may sometimes almost fill the bowel as a thick rope or bundle.

The intestine of a fowl cut open to show a heavy infestation of roundworms.

The eggs of roundworms are very small and are deposited by the female in the fowl's intestine, from which they pass with the droppings. The eggs are not at first infectious, but under suitable conditions of warmth and moisture a small, worm-like larva develops in the egg. When the egg is subsequently swallowed by a fowl the young worm hatches out and lives in the intestine for a number of days, after which it begins to attack the lining of the intestinal wall.

Worms produce harmful effects by absorbing foodstuff and damaging the internal organs, with resultant inflammation.

The eggs of roundworms are resistant to low temperatures and may remain unharmed when covered by soil for many months. However, they are not resistant to heat.

## Control

Though the use of drugs is satisfactory for control of roundworms, good sanitation is still the householder's first line of defence. Because of their greater susceptibility to infection young birds may be affected for some time before the poultry keeper realises something is amiss.

The floor in laying and rearing pens should be dry to ensure that the birds make contact with a minimum only of moist droppings. Care should be taken when grain is scattered that it is confined to the littered portions of the floor.

Litter is most essential in poultry houses, and earth and concrete floors should be covered with it to a good depth. Litter may consist of material such as straw, chaff, and wood shavings, and it should be built up over the season to a depth of 8in. to 10in.

Litter should be frequently turned over with a small gardening fork and wet patches removed. Dry litter will absorb a considerable amount of droppings.

Wet patches of litter are often found near the water supply, and other danger spots may be created by rubbish such as old cabbage stalks, decayed greenstuff, bones, and food scraps.

The general practice of providing an outside run or scratch yard is often conducive to worm infestation, particularly when the ground is shared by adult birds and young stock.

Such yards may have a high degree of "fowlsickness" and nullify measures taken to compensate for lack of adequate intensive accommodation. Consequently, household poultry keepers are not advised to use inadequate outside runs for their birds. Provided the house allows 4½ to 5 sq. ft. floor space for pullets, outside runs are unnecessary and usually should be avoided.

In addition to hygiene certain routine measures of control which involve drenching are advocated. Young pullets are usually treated at about 3 months of age and again at 5 months. Treatment may be either on a flock or individual basis, but for household poultry keepers the treating of individual birds is recommended, as generally a limited number only have to be dosed.

**Individual Drenching**

Individual dosing is perhaps the most efficacious, as each bird receives the desired quantity of drug.

Carbon tetrachloride has proved efficient and safe and is administered in gelatine capsules, which are readily obtainable.

Before being dosed birds should be deprived of food for a number of hours. The usual practice is to give them a morning meal and then treat them before they perch.

Recommended doses are: Birds of 3 to 4 months, one 1 c.c. capsule; 5 months and older, two 1 c.c. capsules.

The poultry keeper can give the drug single-handed if he holds the bird in one hand under its wings or tucks it into his arm pit. He can then open the beak and drop in the capsule. The bird will swallow the capsule readily if the beak is then closed and the head lifted up slightly. The process is of course quicker and easier with two operators.

After receiving the drug birds may be released in the house.

## Tapeworms

Though tapeworms are not uncommon, heavy infestations fortunately are rare in New Zealand. Tapeworms are flat, pale white, and segmented, and vary in size. They are not as easy to recognise as the large roundworm.

The variety most commonly seen looks like white cotton thread and may be several inches long; it may inhabit the small intestine. Propagation is by segments which drop off in the intestine and then pass out through the droppings, which must then be eaten by intermediate hosts such as slugs, snails, beetles, and other small insects. If the secondary host is swallowed by a fowl and the larvae reach a certain stage, the cycle is completed.

The tapeworm buries its head in the wall of the intestine and is difficult to dislodge with drugs. Carbon tetrachloride is of limited value, as though it will remove segments, the head of the worm may remain intact and segments grow again.

## Control

A severe tapeworm infestation is unlikely in most household flocks. Normal preventive measures should suffice, as birds kept intensively and not exposed to large numbers of intermediate hosts remain comparatively immune. This is another reason for not allowing household flocks to run out on limited and stale outside runs. Where birds are kept inside under clean conditions there should be no trouble from tapeworms.



# Correspondence Courses in Agriculture

**CORRESPONDENCE courses in agricultural subjects are provided by the two correspondence schools of the Department of Education in Wellington for students in any part of New Zealand who cannot attend day or evening classes in their locality. These schools are the Correspondence School and the Technical Correspondence School.**

**THE Correspondence School** provides post-primary courses in agriculture up to School Certificate standard for both full-time and part-time pupils. Applicants for courses who have had no agricultural experience or have not previously studied agricultural subjects should apply for one of the introductory courses listed as available from the Correspondence School. Further information may be obtained from the Headmaster, Correspondence School, Clifton Terrace, Wellington.

**The Technical Correspondence School** provides courses of a practical and applied nature for part-time students engaged in agricultural or horticultural work. Details may be obtained from the Principal, Technical Correspondence School, 29 Wallace Street, Wellington.

Free post-primary education for 5 years or until the end of the year in which he or she reaches the age of 19 (whichever is the longer) is granted to every person in New Zealand. Applicants for correspondence courses who have not completed a 5-year period of free post-primary education are therefore entitled to receive their courses free until they have completed that period. Students who already have had 5 years' free post-primary education have to pay fees for courses at both correspondence schools, but these fees are low and text-books may be hired.

## Correspondence School Courses

**Farm Practice**

A 1-year course dealing briefly with the more important branches of New Zealand's agriculture. This course is used as an introduction to the agricultural subjects of School Certificate, but it is also suitable for general study by pupils and adults interested in farming in New Zealand.

**School Certificate Subjects**

**General agriculture.** A 2-year course covering how a plant grows, seed certification; soils, fertilisers, and manures; crops and pastures; the main types of plant and animal life of interest to the farmer.

**Animal husbandry.** A 2-year course covering the cow, pig, horse, and sheep; principal breeds; current economic problems in stock farming; wool; pastures and their management; supplementary crops; genetics; physiology and diseases.

**Dairying.** A 2-year course covering milk, cream, butter, and cheese; their production and distribution; herd testing and improvement; care and management of cattle; use of dairy products.

**Biology.** A 2-year course covering the form and function of plants and animals in relation to their environments.

**Horticulture.** A 2-year course covering plant form, function, and growth in relation to gardening matters.

The School Certificate subjects may also be taken for general knowledge by non-examination pupils. Any number of the above courses can be studied at the same time and provision is made for both written and practical work.

**Subjects for Junior Examination of National Diploma of Horticulture**

Chemistry.
Bookkeeping.

## Technical Correspondence School Courses

### Agriculture

**Dairy Farming**

The course gives a knowledge of the breeding, rearing, and general management of dairy stock under the grassland system of farming practised in New Zealand.

Consideration is given to soil and fertilisers, pasture management, farm layout, shed construction, sharemilking, valuing and purchasing farms, and pig husbandry.

**Sheep Farming**

The course covers principles of breeding, growth and development, nutrition, pasture management, wool, wool types, factors affecting wool production, and preparation of the wool clip.

**Arable Farming**

The course deals with the general characteristics of arable farming, crops and cropping, stock policy, management of pastures and equipment, budgeting, and the yearly cycle of operations.

### Horticulture

**Courses for the Junior, Intermediate, and National Diploma Examinations of the Royal New Zealand Institute of Horticulture**

Horticultural botany.
Principles of botanical classification.
Principles of plant protection.
Principles of horticulture.
Practice of horticulture.

**Certificate in Vegetable Culture**

Course for those engaged in market vegetable production.

**Courses for Horticultural Apprentices**

General horticulture.
Horticultural botany.

### Dairy Manufacture

The purpose of the courses in dairy manufacture is to offer workers in the dairy industry theoretical instruction in butter and cheese manufacture and to provide the necessary tuition for those who wish to enter as candidates for the Dairy Factory Managers' Registration Board examination.

The courses give instruction in the following subjects:—

Buttermaking.
Cheesemaking.
Dairy factory management.

### Rural Valuation

Courses in the following subjects of the professional examination of the New Zealand Institute of Valuers are available.

Field husbandry.
Animal husbandry.
Surveying, levelling and drainage.
Rural valuation law and farm economics.

### Short Courses

Short courses are available in the following subjects:—

Milk.
Concrete for the home and the farm.
Farm bookkeeping.
Fruit growing.
Practical horticulture.
Introduction to forestry.
Vegetable growing.

# Routine Work during the Honey Flow

## Seasonal Notes for the Domestic Beekeeper

By A. W. BENNETT,
Apiary Instructor, Department of Agriculture, Hamilton

**BEEKEEPERS who have worked hard during spring checking hives for stores and freedom from disease and manipulating hives to encourage the production of really strong colonies can now relax their efforts for a brief period and await the harvest of the bees' working.**

IN most districts the main honey flow will be on, and with fine, sunny days the bees will be working hard from daylight to dark. Very few beginners realise how much the bees can collect in a day or so. A super of empty combs or foundation is often put on a strong hive in the expectation that this will keep the bees occupied for several weeks. Lack of appreciation of how quickly bees will fill combs under favourable conditions accounts for many domestic beekeepers not securing the crop of honey they should.

White clover in bloom. Warm, sunny days appear to be required before much nectar is collected from this source.

### Honey Flow Indication

Many commercial beekeepers keep a honey flow barometer in the form of a scale hive. This is just an average hive placed on an accurate set of platform scales. Taking the readings morning and evening gives a very good indication of how much nectar has been collected in the day. Some days the difference in readings may be only a few pounds, and on others it might go up to 20lb. or even over. A few days at the latter rate mean that supers will be full up and the hives will require more room immediately.

The routine work for this month, therefore, should be confined mainly to checking over the hives and giving them extra combs as required. At this time a beekeeper appreciates having heeded the warning to make up earlier an ample surplus of supers and combs of foundation. It is bad beekeeping to have the hives full up with the bees clustered on the outside waiting for the beekeeper to supply extra room for them. Sometimes bees in desperation will even begin to build comb on the outside of the hive. Beekeepers should not lose the result of all spring management by neglecting to check up quickly on the storage space requirements of each hive.

In some favoured localities the limit to the number of supers that can be put on a hive may be reached when conditions are just right for a heavy

*Lotus uliginosus* (*major*) in flower.

Flowers of the tawari, a bush source of nectar.

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nectar flow. Immediate preparation should then be made to extract some of the honey so that empty combs are available.

The usual pattern for adding honey supers to a hive is to take note of the condition of the super already on the hive. If this is almost filled with honey and a few of the combs are capped over, it is time to lift this up and place the super with empty combs or foundation underneath, provided a queen excluder is being used above the brood nest. If one is not being used, it would be best to do what is called "top supering", that is, place the empty super above the filled one, as sometimes if the empty super is placed underneath, the queen may be enticed into it. At this time of the season any more brood rearing should not be encouraged, as these extra bees will arrive too late to be of much use.

If more room is still required, the extractor will have to be used. Care should be taken to extract only combs that are fairly well capped over. At this time it may be impossible to find combs completely capped. It should be remembered that uncapped honey at this period of the season has still some moisture to be removed by the bees. Therefore, if too much of this honey is extracted, there will be a great risk of the honey not keeping well, because excess moisture encourages fermentation or sourness in it.

### Main Nectar Sources

As bees are busy working on all the available nectar sources, beekeepers might be interested in a short description of the important flowers that will be yielding nectar now.

**White clover** is found in pastures in all parts of New Zealand. Warm, sunny days appear to be required before much nectar is collected from this source. The honey is water white and mild in flavour.

**Blackberry** is a plant that yields nectar under most conditions and is to be found in most parts of the country. The honey is water white and of mild flavour. An interesting feature about this honey is that when it is beginning to granulate it goes a dull or putty colour. Even when fully granulated it never has the bright, attractive appearance of clover honey. Apart from this it is a very good honey, and good yields are generally obtained where there are large areas of the plant on waste lands. Unfortunately for beekeepers blackberry is being rapidly eradicated by chemical weed-killers.

**Thistle** is another valuable source of good white honey of mild flavour.

**Catsear** is one of the best honey-yielding plants. It appears to grow in most parts of both islands and flowers fairly regularly every year. The plant is very much like dandelion, which flowers in spring, but it grows much taller and has more flower heads per plant. In some parts it is often called capeweed. This is not correct, as the capeweed flower has a black centre and is quite pretty. A beekeeper can generally tell when his bees are working catsear, because the combs and cappings in the hive become bright yellow. The honey when extracted is brilliant gold and looks very attractive in glass jars. The beeswax taken from the cappings is also very bright yellow.

Catsear, showing prominently here, is one of the best honey-yielding plants.

*Lotus uliginosus (major)*: This plant usually flourishes on damp pastures and roadsides. It yields a honey very similar to that from catsear, with almost identical characteristics.

**Tawari** is one of the bush sources of honey; it produces a fairly light honey with rather an unusual flavour that is not liked by many. This native tree flourishes on the higher bushland around about 1000ft. to 3000ft. and is confined to the northern part of the North Island. It is a beautiful bushy or canopy tree with the flowers clustered on the top.

# Cereals for Greenfeed in South Island

THOUGH saved pasture or special pastures of short-rotation or Italian ryegrass are used extensively as greenfeed, autumn-sown cereals still provide the greatest bulk of feed for this purpose. On most arable farms they fit ideally into the crop rotation, as they can be sown after ploughing old lea or after rape or a cash crop harvested in January-February.

The type of cereal sown depends on a number of factors such as type of country and climate, when the bulk of feed is required, and whether or not the intention is to save the crop for harvest later.

The cereals given consideration are ryecorn, barley, oats, and wheat.

**Ryecorn** is mainly confined to the poorer, colder class of country and here the C.R.D. variety is providing very satisfactory results.

**Barley** is used mainly for later sowings, since it has the ability to grow late into winter. All varieties except Wong have the disadvantage, however, of not making adequate regrowth after the first spring feeding.

**Oats:** The several varieties of oats still remain the most popular form of greenfeed and can be relied on to provide good feed in early spring for ewes and lambs and then make sufficient rapid regrowth for a good second feeding.

**Wheat:** Early autumn sown wheat can provide a good bulk of grazing in early September.

Irrespective of the time of feeding greenfeed it is a sound management practice to stake bales of hay in greenfeed paddocks to allow stock to pick at when desired. This is especially so where set stocking is practised, as in other cases hay is normally provided on the run-off.

—*D. G. REYNOLDS,*
*Instructor in Agriculture,*
*Department of Agriculture,*
*Oamaru*

# Care of Livestock during February

Contributed by the Animal Research Division

**PREPARATIONS FOR TUPPING**

IF ewes have been held on short pasture since weaning, they should now be in good, hard condition. About 21 days before tupping they should be crutched and given the best pasture available. Experiments at Ruakura have shown that flushing ewes for 3 weeks before tupping and keeping them on good pasture for 3 weeks after tupping begins increases the number of lambs marked by 20 per cent. Rams, too, should be crutched and flushed for about 3 weeks before tupping. They should be dipped before this flushing period, as dipping too close to tupping appears to reduce ram fertility.

**COBALT DEFICIENCY**

Bush sickness can be completely prevented by topdressing annually with cobaltised superphosphate, and in the North Island at least this is best applied in the annual autumn topdressing. Cobaltised superphosphate prepared in North Island works contains 3lb. of cobalt sulphate per ton, and 2cwt. of this fertiliser contains sufficient cobalt for 1 acre. In the South Island cobaltised superphosphate contains 6lb. of cobalt sulphate per ton, and 1cwt. of this fertiliser contains sufficient cobalt for 1 acre. If greater quantities of fertiliser than these are used, the additional amount need not be cobaltised. Fuller details can be obtained in Department of Agriculture Bulletin No. 180, "Cobalt Deficiency in Sheep and Cattle".

**COPPER DEFICIENCY**

Scouring in cattle and staggering in lambs grazing on peat and other copper-deficient land can be prevented by topdressing the pastures in autumn with 5lb. of bluestone per acre. Copperised superphosphate is now available, or the bluestone may be mixed with lime. For fuller particulars the Department's Bulletin No. 238, "Copper Deficiency in Cattle and Sheep", should be consulted.

**FACIAL ECZEMA**

If warm rains fall in February after a spell of hot weather, facial eczema is likely to occur in districts which are usually affected. Experience during recent years has shown conclusively that the disease can be prevented by shutting sheep up at a rate which leaves no pasture in the paddock after 24 hours. Sheep should be shut up as soon as rains fall and should be confined until the weather becomes either hot and dry or much cooler and the pasture visible hardens. If the summer is hot, plans should be made for action as described here. Feeding of good hay at 2lb. per sheep per day will prevent loss of condition. Even if adequate hay is not available, when ample water is provided ewes are not harmed by 1 or 2 weeks' starvation. It is better to take precautions too often than to run the risk of a disastrous outbreak of facial eczema. If crops of rape, kale, turnips, or chou moellier are available, they can safely be grazed during the dangerous period. The grazing of such crops is the only satisfactory way of preventing the disease in lambs, which react badly to restricted grazing. Lucerne has not proved safe, possibly because of ryegrass, which is frequently present as a weed, but in east coast districts paddocks of pure white clover are safe and lambs do well on them. Bulletin No. 388, "Losses from Facial Eczema Can be Prevented", giving details of the cause and prevention of facial eczema, is available from all Departmental offices.

**PULLORUM DISEASE IN POULTRY**

Preparations should now be made for the autumn hatch by blood testing the flock for pullorum disease and by cleaning and fumigating the incubators. A vacuum cleaner is ideal for cleaning, and advice on fumigation may be obtained from the local Poultry Instructor.

**CARE OF CALVES**

Autumn is a critical period for calves. Deaths during winter can be eliminated by rotating the calves through the paddocks ahead of the cows at intervals of 3 or 4 days. If this is not being done, it should be begun immediately. Calves treated in such a way will be up to 100lb. heavier as yearlings than those kept confined in a calf paddock. If calves are unthrifty and scouring, it may be necessary to give two or three doses of phenothiazine at 3-weekly intervals, but this is seldom necessary with calves which are rotationally grazed.

**BOVINE INFERTILITY**

Bovine infertility may be due to several infectious diseases which are known to be present in New Zealand. Reliable tests for these are now available. If more than the usual number of cows are still empty, veterinary assistance should be sought promptly.

**SOWS AND WEANERS**

Sows with litters should be fed 4 gallons of milk plus 2/3 gallon per pig suckled. Sows and litters should be allowed at least 2 hours' grazing per day. It is an advantage to provide water sprays for both suckling and dry sows during summer; since pigs possess very few sweat glands, they can be kept cool only by the evaporation of water from the skin. Litters over 3 weeks of age must have milk and meal available at all times. Observations at Ruakura have shown that piglets suckle at intervals of 75 to 90 minutes throughout the 24 hours, and after the sixth week they visit the creep after each suckling. Good creep management can add 6lb. to 10lb. to a pig's weaning weight. Weaned sows must be well fed to ensure successful mating. A ration of 4 to 6 gallons of milk daily plus grass is essential. Weaned pigs should be fed 1½ to 2 gallons of milk daily. If there is not sufficient milk to provide this, the feeding of meal to supplement the milk ration, 1lb. of meal replacing 1 gallon of milk, is highly profitable at present meal and meat prices.

**VITAMIN A FOR GROWING AND LAYING BIRDS**

Vitamin A is essential to poultry for protection against various infections, particularly colds and contagious catarrh. Poor egg production is a common feature of an inadequate supply of vitamin A to laying birds. Greenfeed is a useful source, but at certain periods of the year when it is scarce or poor in quality it may be of little value. Growing birds on open range may suffer from vitamin A deficiency during very prolonged spells of dry weather. Though there may apparently be plenty of greenfeed available, it may be of very poor quality. The addition of a vitamin A supplement such as fish oils, emulsions, or synthetic and stabilised vitamins during times when greenfeed is scarce or of doubtful quality is advisable for both growing and laying birds. The amounts used vary according to the age of the birds and the potency of the oil used. The quantity advised by the manufacturer of the oil should be added to the diet. Further advice on the use of vitamin A supplements may be obtained from the local Poultry Instructor of the Department of Agriculture, and a special leaflet on the subject is available.

# Preparation for Autumn-sown Pastures

## Seasonal Notes by the Extension Division

CONSIDERATION should now be given to the preparation of land for autumn pasture sowing and the selection of pasture seeds mixtures. On ploughable land the aim should be to bring the seed-bed to a fine, moist, and firm condition for sowing as early as the weather allows in late summer or early autumn.

**SEED-BED**

A FIRM seed bed is essential for a satisfactory strike of clovers and grasses. If the seed-bed is loose, the clovers do not strike; it should be firmed throughout its depth. On light land it is usually necessary to roll on the furrow to firm the bottom layers and on heavy land time must be allowed in seed-bed preparation for the soil to settle. Cultivation operations should be conditioned by the weather and arranged to avoid drying out the soil in hot, windy weather.

*—W. L. OSBORN*

* * *

**PLOUGH NOW FOR GRASS TO GRASS**

IN regrassing a paddock by ploughing and resowing it is generally preferable to utilise the period under the plough for the growing of a summer crop to replace the fodder which would be produced if the paddock were not under cultivation. In some cases, however, more especially on run-out pastures on light soils, where annual weeds in crops are troublesome, where the sowing of a summer crop has been too long delayed, or where a crop is not wanted, the grass-to-grass method of pasture renovation may be preferred. In this case early ploughing is essential to allow time for the plant roots to decompose before the pasture seed is sown. On clay soils early ploughing will also allow the clods to break down before they become baked by summer drought. A wide, flat furrow should be turned and ploughing should be followed by a rolling on the furrows and then by discing to secure a fine tilth. If grasses such as paspalum and browntop dominate the pasture and are likely to reappear between the furrows, a skim ploughing now may be followed by a deeper ploughing about a month later. Repeated tine harrowings should be carried out through summer to destroy weed growth and to secure consolidation before sowing.

*—B. A. GUNNING*

* * *

**OVERSOWN CLOVERS**

THE introduction of clovers into surface-sown hill country pastures is necessary to secure payable returns from topdressing. The preparation of paddocks for oversowing therefore warrants careful planning to ensure the best possible establishment under the prevailing conditions. Though circumstances vary, experience has shown that it is difficult to cope successfully with more than a fifth of the farm in any one year. Paddocks intended for oversowing this autumn should be sorted out now and given special treatment. Management should be based on the simple fact that if the clover seed is to get a chance to establish, it must first find contact with the soil. The cleaning up of all rank growth is therefore of first importance. Ewes in large mobs can assist greatly here, but final preparation is usually best done with cattle. Where water is available and the contour is suitable rough faces can be very effectively cleaned out by using the electric fence to confine the cattle. Because of their weight cattle will also make the best job of cutting up the turf through hoof action.

Swards that contain little or no clover are usually open in the bottom, so that provided the roughage is thoroughly cleaned off, the clover seed has a good chance of reaching the soil. However, swards that already have a fair amount of volunteer clover in their make-up, either because of high natural fertility or through previous topdressing, are usually much tighter. Such pastures can be handled more effectively if previously they have been allowed to get away. This opens up the bottom and the extra feed available means that cattle can be held on the paddock longer. This in turn results in more hoof action.

Poor, clover-deficient swards, especially on droughty soils, should not be grazed down too hard before oversowing; otherwise the establishing seedlings will be robbed of their early shelter, which is often the most important factor in their survival. A stubble of about an inch or slightly more under such conditions is distinctly beneficial. However, on the better swards close grazing immediately before oversowing is desirable, because more ground surface is exposed, and sufficient recovery of the pasture can usually be counted on to give adequate protection to the seedlings later.

*—L. W. BLACKMORE*

* * *

**FLUSHING**

MANY ewes which normally lamb will produce twins if fed well just before and during the tupping period. Work at Ruakura has shown that properly flushed 5-year-old ewes produced about 20 per cent. more lambs than others left unflushed.

Under fat lamb conditions extra lambs resulting from twinning are particularly desirable at present, as the market strongly favours lightweight lambs. Only very small additional costs are involved in raising twins instead of single lambs. On hill country properties extra lambs are handy for ewes which lose their lambs to foster and many older ewes are quite capable of rearing twins. Unless a proportion of twins are accepted on hill country, lambing percentages must remain low. Smaller twin animals are no more difficult to rear during the hogget stage than larger singles.

To obtain the full advantages of flushing ewes should be placed on ample feed 3 weeks before joining with the rams. Fed well, they quickly put on weight and shed the maximum number of eggs. Such feeding should be continued for 3 to 4 weeks after the ewes begin to take the rams. This allows each ewe to be tupped twice over the period during which good feed is provided. Those ewes which do not hold to the first mating and others that do not come on heat during the first round are then catered for. Flushing may be continued if sufficient feed is available, but in April and May the need to set aside feed for wintering should not be overlooked.

In many districts summer and early autumn growth is insufficient for adequate flushing. In such cases, if weaning takes place about the beginning of December before all late spring growth is utilised, feed can be carried over until February or March. On hill country some paddocks should be shut up from mid-December onward to provide suitable mature feed for hoggets in autumn and early winter and others for flushing the ewes at tupping time.

Either crop or pasture is suitable for flushing, so long as the objective of bringing about a rapid weight increase is achieved. In districts where facial eczema outbreaks are frequent cropping is well worth while.

Sufficient crop can be grown for flushing and facial eczema control during autumn at a cost of between £10 and £25 per 100 ewes, including reseeding to pasture. Quite small increases in lambing percentages would cover these costs. As cropping has other worthwhile advantages, it could be used much more widely than at present.

*—J. D. SCOTT*

# Economic Factors in Hill Country Development

By R. H. SCOTT,

Land Utilisation Officer, Department of Agriculture, Wellington

**DEVELOPMENT of hill country has been brought to such a high state of efficiency by some farmers in some districts that estimates of potential carrying capacity on some hill-type soils made about 8 years ago are already being exceeded. Development methods that have enabled one ewe equivalent per acre more than the estimated potential to be carried on a southern Hawke's Bay hill country property on two typical soil types are described in this article and the financial aspects discussed.**

IN the Soil Bureau Bulletin (n.s.)5 "A General Survey of the Soils of the North Island" information is given about the present and potential carrying capacity of the various soil types. This information was supplied in 1948 and 1949 by field officers of the Extension Division of the Department of Agriculture and was based on the knowledge at that time of the capabilities of the soil types. For instance, among the hill country soils, of which there are extensive areas in southern Hawke's Bay, two, the Atua silt loam and the Taihape silt loam, had an estimated potential carrying capacity of between 2 and 2½ ewes and between 2 and 3 ewes per acre respectively.

Today these estimates are obsolete, for carrying capacities equivalent to 3½ ewes per acre have already been achieved on these soils, and the ultimate carrying capacities have not yet been reached.

The farm is about 40 miles south-east of Dannevirke and is of 610 acres, which is typical of the size of most of the hill country farms in the Hawke's Bay and Wairarapa districts. There is very little flat land on the farm, most of which comprises rolling to moderately steep country, with some steep parts. About 400 acres, or two-thirds of the area, can be disced, the remaining 200 acres being too steep for cultivation. The average annual rainfall is about 45in., which is fairly evenly distributed throughout the year, except for a dry summer period typical of the Hawke's Bay area generally.

## Condition of the Farm

When the present owner took possession of the farm in 1947 it was in very poor condition and fences were poor and mainly ineffective. The only stock water supply was from one dam and a creek at the back of the farm, these having to serve 610 acres, divided ostensibly into 15 paddocks. Pastures comprised mainly browntop, danthonia, Yorkshire fog, flatweeds, and moss, and there was scattered manuka over the whole property. Fertiliser had never been used and the buildings were in a poor state. The sheep taken over with the property were of a type one would expect to find on such a farm.

## Development Programme

The owner started his development programme in the first season (1947-48) by topdressing by hand the whole farm with 2cwt. of superphosphate per acre, and a vigorous start was made on scrub cutting. In the 1949-50 season oversowing with white and subterranean clover was begun, again by hand, 230 acres, or about 40 per cent. of the farm, being treated that season. To accelerate the development programme a beginning was made 5 years ago to clear some areas of stumps, cultivate, and sow to pasture. The table sets out the development work which was completed in the 8 seasons ending 30 June 1955:—

**TABLE I—IMPROVEMENTS EFFECTED IN 8 SEASONS ENDED 30 JUNE 1955**

| | |
|---|---|
| Area oversown with subterranean and white clover .. .. .. | 434 acres |
| Area cultivated and sown to pasture .. .. .. .. | 137 acres |
| Dams constructed for stock water | 15 |
| Farm access tracks constructed .. | 4 miles |
| Additional subdivisional fences .. | 40 chains |
| Air strip 16 chains x 2 chains constructed | |

## Development Costs

Most of the clearing and cultivation work has been done by agricultural contractors with heavy equipment. The first paddock, of 35 acres, which was cleared of stumps, broken up, and sown to pasture in April 1952 cost £24 5s. per acre. The work consisted of clearing stumps and logs with a blade attached to a heavy tracklaying tractor, two discings with giant discs, a cut with tandem discs, levelling, harrowing, and sowing to pasture. Another paddock worked out at £20 0s. 8d. per acre, and an area of 40 acres sown to pasture in March

**Below and on opposite page—A general view of the farm. In the foreground is unimproved country, and across the centre is an area which has been cultivated and sown to new pasture.**

1955 cost £22 19s. 3d. per acre. The cost components for the paddock which cost £20 0s. 8d. per acre were as follows:—

| | £ | s. | d. |
|---|---|---|---|
| Land clearing, cultivation, and sowing costs .. .. | 10 | 9 | 10 |
| Lime (1 ton per acre) .. | 2 | 5 | 6 |
| Superphosphate (3cwt. per acre) .. .. .. .. | 2 | 0 | 10 |
| Pasture seed .. .. .. | 5 | 4 | 6 |
| | 20 | 0 | 8 |

The cost of constructing dams for stock water has ranged between £39 and £45 each, new subdivision fencing has worked out at £7 per chain, and constructing and sowing down the airstrip accounted for £480. Of the total land development expenditure of £8720 incurred in the 8 years to 30 June 1955 no less than £6966 or 80 per cent. was for improving existing pastures by oversowing and topdressing and establishing new pastures.

## Physical Results

The main factors to measure the physical results achieved on this farm are (a) the stock carried per acre and (b) the wool production per acre.

All stock on the farm have been converted to the common denominator—the ewe—and from a carrying capacity equivalent to 1.6 ewes per acre in the winter of 1947 a carrying capacity equivalent to 3.7 ewes per acre was achieved by the winter of 1955. Table 2 sets out the increase over the period.

TABLE 2—CARRYING CAPACITY PER ACRE

| | Ewes per acre | | Ewes per acre |
|---|---|---|---|
| 1947 .. .. | 1.6 | 1952 .. .. | 3.0 |
| 1948 .. .. | 2.2 | 1953 .. .. | 3.1 |
| 1949 .. .. | 2.5 | 1954 .. .. | 3.5 |
| 1950 .. .. | 2.4 | 1955 .. .. | 3.7 |
| 1951 .. .. | 2.4 | | |

Not only has wool production per acre nearly doubled, but the quality of the wool has improved considerably, and in the 1955-56 season the clip obtained the highest price at the first Napier wool sale. The trend in wool production per acre is given in Table 3.

TABLE 3—WOOL PRODUCTION PER ACRE

| | Lb. per acre | | Lb. per acre |
|---|---|---|---|
| 1947-48 .. | 17.0 | 1952-53 .. | 24.2 |
| 1948-49 .. | 19.5 | 1953-54 .. | 26.3 |
| 1949-50 .. | 21.7 | 1954-55 .. | 29.6 |
| 1950-51 .. | 19.1 | 1955-56 .. | 32.9 |
| 1951-52 .. | 23.1 | | |

The farm had been run as an extensive pastoral enterprise, with farm revenue coming from the sale of wool and store and breeding stock. However, with the improved pastures it has been possible to fatten lambs, and in the 1952-53 season a draft of 128 fat lambs was sold, these being the first lambs ever fattened on the property. In 1953-54 198 fat lambs were sold and in 1954-55 202 were sold.

## Financial Aspects

To appreciate the initial financial difficulties of the farmer it is necessary to look at the capital limitations of the enterprise when he took over. As a returned serviceman he obtained rehabilitation finance, which was at a lower interest rate than the normal State Advances Corporation lending rate, and the margin between the value of the security offered for the loan and the amount of the loan was much less than that required under the Corporation's normal lending policy. In June 1947, at the time he took possession of the property, the position broadly was as set out in Table 4.

TABLE 4—CAPITAL STRUCTURE OF ENTERPRISE IN JUNE 1947

| | £ | | £ |
|---|---|---|---|
| Value of land improvements | 5,700 | Mortgage .. | 7,250 |
| Value of livestock .. | 1,600 | | |
| Cash .. .. | 600 | | |
| | 7,900 | | 7,250 |

This was not an inspiring financial picture for any lender, nor was it a very encouraging one for the farmer, for he was faced with two immediate problems:—

1. The necessity to begin building up the fertility of the property, and

2. The necessity to replace the poor ewe flock.

With the £600 cash and no other equities, but with hope for the future, a capacity for hard work, and innate ability in judging the quality of livestock, the farmer cast the die by purchasing a line of good, though old,

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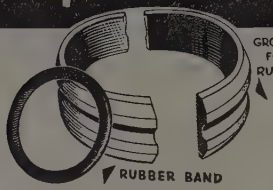


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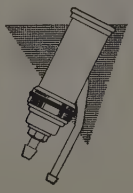

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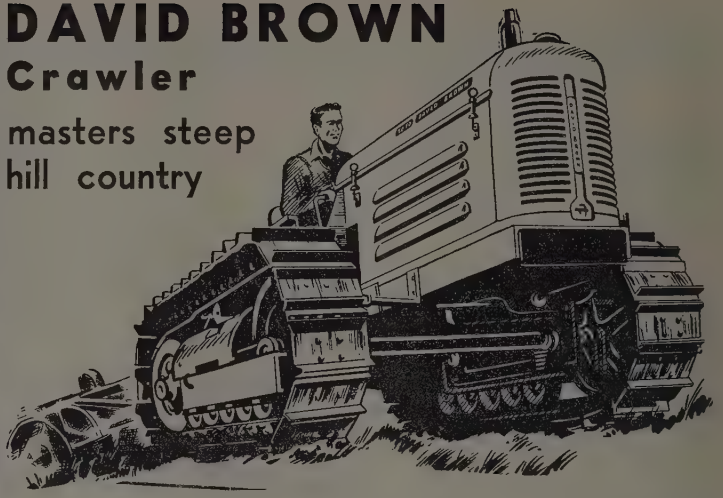

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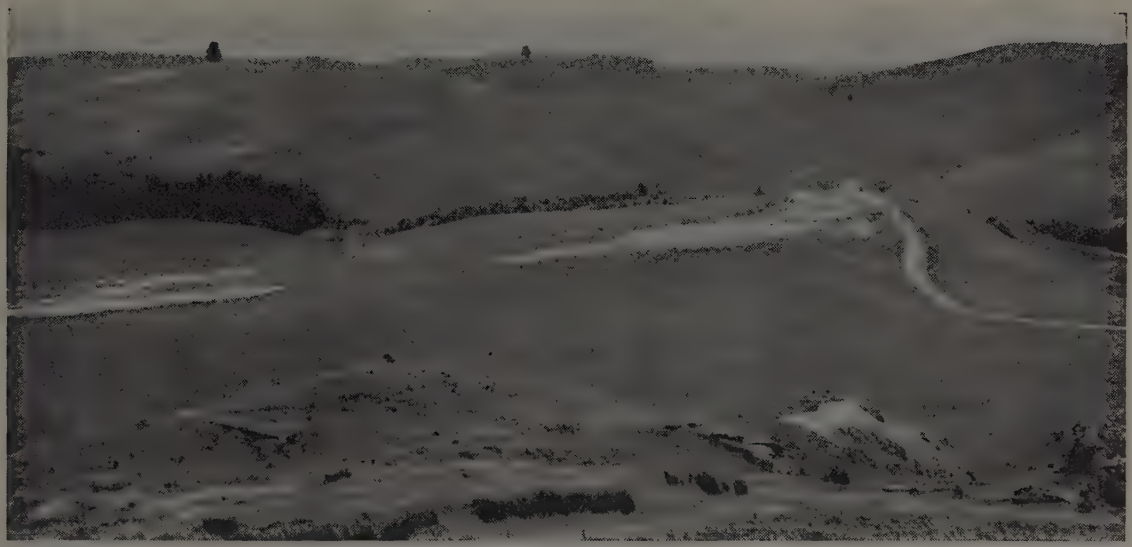


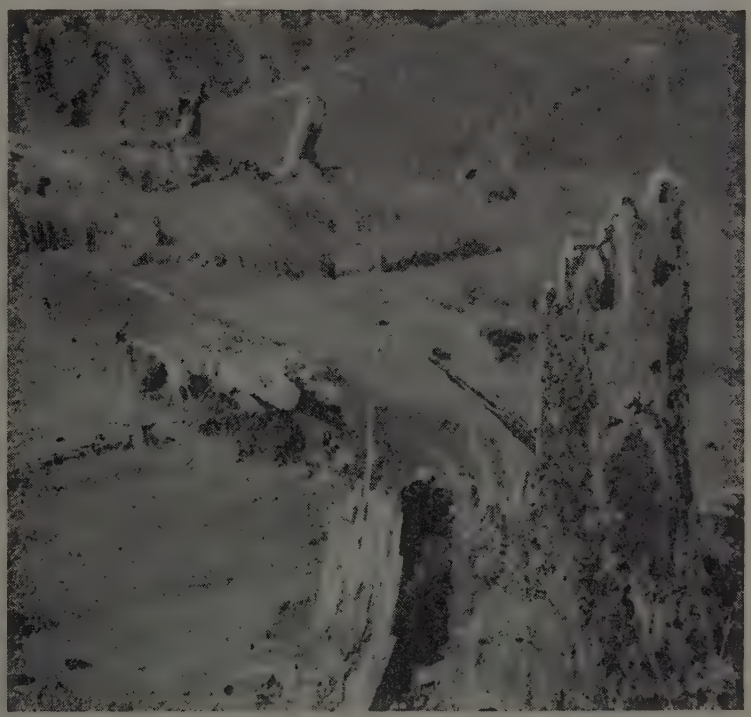
The airstrip was constructed in the 1954-55 season. In 1948 the whole farm was laboriously topdressed by hand, which with other farm work took the owner several weeks. In September 1955 66 tons of superphosphate were applied to 565 acres by a small aeroplane in 13 hours' operating time.

ewes, selling most of those taken over with the property, and purchasing sufficient superphosphate to topdress the whole farm with 2cwt. per acre. In spite of what some considered to be foolhardiness, the results for the year were satisfactory; there was a cash surplus of £317. Also during the year a stock firm with knowledge of the good personal factor supplied some short-term seasonal finance. In the following year the owner began his cattle enterprise by buying some breeding cows, and today about 60 Aberdeen Angus breeding cows are carried as well as replacement and dry stock.

To analyse each year's financial transactions makes tedious a study of this nature, so the figures set out in Table 5 apply to the 8 years ended 30 June 1955.

**TABLE 5—RECEIPTS AND PAYMENTS FOR 8 YEARS FROM 1947-48 TO 1954-55**

| | £ | | £ |
|---|---|---|---|
| Farm running expenses | 13,130 | Cash receipts | 34,910 |
| Interest on mortgage | 2,220 | Additional capital obtained from outside sources .. | 2,510 |
| Principal repayments on mortgage | 1,170 | | |
| Taxation .. | 3,380 | | |
| **Capital Expenditure** | | | |
| Land development .. | 8,720 | | |
| Improvement to dwelling . | 900 | | |
| Livestock .. | 4,030 | | |
| Equipment | 1,310 | | |
| | 34,860 | | |
| Cash surplus | 2,560 | | |
| | 37,420 | | 37,420 |



Before cultivation can be attempted stumps and logs have to be removed, and the cost of this work has been as high as £4 3s. per acre.

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In Table 5 some of the figures differ from those disclosed in the farm records. As indicated earlier the mortgage was one with the special low interest rate to returned servicemen. To bring the mortgage payments more in line with what many farmers were paying, the mortgage was recomputed on the basis of one for £7250, repayable over 30 years, with interest at 4⅛ per cent., payable half-yearly. Taxation was also recomputed, mainly because of the different annual mortgage interest payment which was used.

The figures show that after taking into account the additional capital of £2510 which was injected into the enterprise over the period, and meeting all farm running expenses, most overheads, taxation, development expenditure, and the cost of additional livestock there was a cash surplus of £2560. However, no allowance has been made for the living expenses of the farmer over the 8 years and the cash surplus met this.

However, the figures demonstrate that the cash receipts from the property were sufficient to meet just over 80 per cent. of the capital expenditure of £14,960.

If the farm is regarded as a business enterprise, one overhead item, depreciation, has been neglected. On plant the depreciation over the period amounted to £630 and on buildings £375. (Only one-quarter of the depreciation on the farm dwelling has been charged against the farm.)

A paddock of 35 acres being cultivated with tandem discs in March 1956 before being sown down.

## Mortgage Repayments

Table 5 shows that £1170 was paid off the mortgage during the 8 years, the mortgage being repayable on the amortisation principle; that is, it is repayable over 30 years by equal annual amounts, these annual amounts comprising part of the principal and interest on the unpaid balance of the mortgage. In this case if the £1170 had not been repaid, the additional capital required for the enterprise would not have exceeded £1350, whereas the actual amount was £2510.

Where the resources to develop a property are limited it appears illogical for a farmer to be making principal repayments on a mortgage and at the same time to be reinvesting the greatest possible amount of surplus

An area which was giant disced late in 1955 after being cleared of stumps.

revenue in the enterprise to increase its productive capacity.

Where a property has a considerable productive potential and the occupier wishes to attain the potential, there appears to be a case for institutions which provide long-term farm mortgage finance to consider placing mortgages on a flat basis for a period until the productive capacity has been increased, at which stage the mortgage could be placed on an amortisation basis.

## Taxation

Taxation payments amounted to £3380, of which £2460 or about 72 per cent. comprised income tax. Though the amount is considerable, it cannot be claimed that its payment has been a hindrance to the development of the farm, particularly as a considerable amount of the surplus revenue reinvested in the property has been treated as an allowable expense for taxation purposes.

Since 1950 to encourage farmers to carry out land improvement work concessions have been made for expenditure for such work. For instance, where unimproved land is cultivated and sown to pasture all expenditure is allowable as a deduction when taxation is assessed, and in addition farmers can expend an aggregate of £300 in any one year (increased from £200 in 1954) on such items as the construction of farm access tracks and aeroplane landing strips, the sum being an allowable expense item.

On this farm the expenditure on land improvement work met from farm revenue over the 8 years was £6210, and except for £740 this was an allowable expense for taxation purposes. In other words, most of the capital expenditure on land improvement work has been allowed as farm running expenses.

## Accelerated Development

Where resources are limited and the cost of improvement work is being met out of surplus revenue stock carrying capacities cannot be raised quickly. On this farm it took about 4 years to raise the capacity from 1.6 to 2.4 ewe equivalents per acre, and between 6 and 7 years to double it. When he began farming the owner had no equities which could be used as security for additional capital from outside sources and he was untried in developing hill country, and was therefore an unknown credit risk. His prospects at that time of being able to obtain additional capital to expedite development would have been very poor.

Though it appears obvious that when expenditure is incurred on developing land to create more and better grass some money must also be spent on additional livestock to utilise the grass, this simple fact is sometimes overlooked by those who advocate the rapid development of unimproved land. On this farm for every £100 spent on land improvement work over the 8 years until 30 June 1955 an additional amount of £46 had to be spent on additional livestock, or alternatively the farmer had to forgo some immediate revenue by retaining stock to build up the productive flock.

The economist explains the position by saying that the productivity of one resource depends on the amount of other resources with which it is combined. If too much capital is employed in pasture improvement, and there is insufficient left to purchase stock and obtain a return from the investment in pasture improvement, there is an unbalance of resources and profits cannot be maximised in as short a time as possible.

## Economics of Development Programme

The farm management economist's tools of analysis such as marginal analysis have not been adopted to test the economics of the development programme on this farm, mainly because in most land development projects increasing inputs of capital and labour do not necessarily result in an immediate financial return, even if prices for farm products and farm costs vary little during the period. In land development projects there is usually a considerable lag between expenditure and resulting maximum returns.

In this case the farm has been regarded as a business enterprise and two factors have been computed to test results. The first factor is "owner surplus per acre" and the second the percentage return on the owner's investment in the enterprise. On this farm owner surplus per annum is the amount available to the owner after meeting farm running expenses, depreciation on assets, interest on the mortgage, and interest on the additional capital invested in the enterprise. In effect owner surplus is the amount available to the owner to meet living expenses, taxation, and investments such as principal repayments on the mortgage as well as reinvestments in the enterprise. This owner surplus is converted to the index owner surplus per acre. Table 6 shows the owner surplus for 1954-55.

To provide adequate stock water 15 dams have been constructed over the past 8 years. The cost of these has ranged from £39 to £45 each.

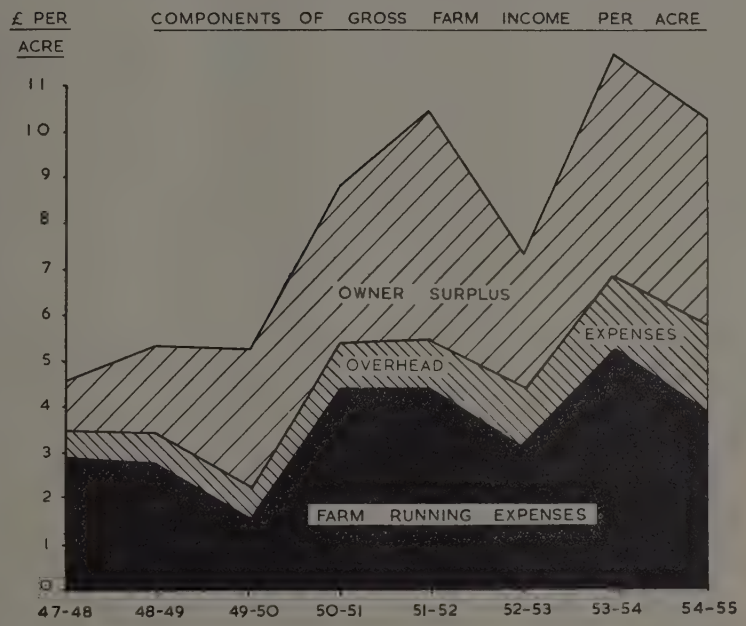
**TABLE 6—OWNER SURPLUS FOR 1954-55**

| | £ | £ |
|---|---|---|
| Receipts .. .. .. | 5,800 | |
| Stock inventory increase .. | 490 | |
| | | 6,290 |
| Farm running expenses .. | 2,390 | |
| Depreciation .. .. .. | 205 | |
| Interest on mortgage .. | 260 | |
| Interest on capital invested in enterprise by owner from revenue, and interest on additional capital injected into enterprise .. | 685 | |
| | | 3,540 |
| Owner surplus .. .. | | 2,750 |

Owner surplus per acre £4 10s. 3d.

The chart at right shows the trend in the components of the gross farm income per acre since the owner took possession of the property. In the first two seasons the owner surplus per acre gradually increased and in the 1950-51 and 1951-52 seasons there was a considerable increase owing to the high wool price obtaining in the 1950-51 season. Part of this amount was paid out in that season and the balance comprising wool retention moneys was paid out the following year to enable the farmer to push ahead with his development programme. In the 1952-53 season receipts from wool were lower, but since then wool receipts have been higher owing to the greater quantity produced, and also to the better quality of the wool. The result during the 1953-54 and 1954-55 seasons has been an owner surplus per acre of between £4 10s. and £5, comprising a little over 40 per cent. of the gross farm income per acre.

To arrive at a percentage return on the farmer's own investment in the enterprise the following computations, though subject to error, were adopted. They actually understate the percentage return on the investment.




(A) Gross farm income = Receipts from the sale of livestock and other products plus or minus changes in the valuation of livestock.

(B) Farm running expenses = Expenses incurred in running the farm to produce the farm receipts.

(C) Overhead expenses = Depreciation on assets plus interest on land mortgage plus interest on the additional capital invested in the enterprise for farm improvement work and additional livestock.

(D) Owner's surplus = A minus (B plus C).

All items have been computed on a per acre basis.

**TABLE 7—FARMER'S INVESTMENT AND RETURN**

**Investment in Enterprise Over 8 Years to 30 June 1955.**

| | £ |
|---|---|
| *Total amount reinvested from surplus farm revenue in the property for development and improvement work .. .. .. | 7,110 |
| Total amount reinvested from surplus farm revenue in equipment, less depreciation on the equipment .. .. .. .. | 780 |
| Total amount invested in additional livestock .. .. .. .. | 4,030 |
| Amount of principal repaid on the mortgage, thus increasing the farmer's equity in the property | 1,170 |
| Total investment by farmer up to 30 June 1955 .. .. .. | 13,090 |

* The actual amount spent on land development and improvement work was £9620, but £2510 of this was obtained from outside sources and does not represent an investment by the farmer.

**Amount Available in 1954-55 as Return on Farmer's Investment**

| | £ | £ |
|---|---|---|
| Farm receipts .. .. .. | | 5,800 |
| Less:— | | |
| Farm running expenses .. | 2,390 | |
| Depreciation .. .. | 205 | |
| Interest on land mortgage | 260 | |
| Interest on additional capital investment in enterprise .. .. .. | 125 | |
| Wages and management reward to farmer .. | 920 | |
| | | 3,900 |
| Amount available as a return on farmer's investment | | 1,900 |

Though not a perfect assessment, the wages and management reward was computed by allowing the farmer an amount equivalent to the ruling farm wage rate and to this was added 2½ per cent. of the total capital investment in the enterprise. This latter was regarded as a reward for managing the capital.

The percentage return on the farmer's investment was therefore about 14.

With farm prices on the present basis the return to this farmer will be sufficient to encourage him to continue his land development work, and he will consider it to be a worthwhile investment.

## The Future

Raising the carrying capacity of a property brings in its train a number of problems and increases the decisions which the farmer must make. On this farm the major problem to be faced in the immediate future is the one arising from the fact that the property has nearly reached the limit of a one-man unit. The question the farmer must now ask himself is: "Shall I expand further and what are the problems associated with this expansion?"

The employment of labour will be essential if production is increased further and this means either the provision of adequate accommodation on the farm or the prospect of a farm worker being provided with a rented house elsewhere. It is likely that the only satisfactory stable labour will be provided by a married man, and to erect another dwelling on the farm may result in an additional capital outlay of about £3000. The cost of labour and the interest on this extra capital could well result in an immediate reduction in the owner surplus from about £4 10s. per acre to a little over £3 per acre.

With the increasing land development work which is being done in the district the question of obtaining additional farm labour will become an issue, and consideration may eventually have to be given to the establishment of a group of houses in the county village for a labour pool, the

When the farmer took possession of the property in 1947 fences were in very poor condition and many were ineffective.

wages of the workers to be guaranteed by some farmers' organisation. There would be problems associated with such a scheme in this locality, such as the transport of the workers to and from farms, as the distances to travel are likely to be considerable. No doubt this could be solved. The use of labour from a pool would help considerably to keep down the capital expenditure on a farm such as this.

The farmer, of course, could carry on for a period without doing any further development work and endeavour to build up a reserve fund for an additional dwelling and for further development work. This would take several years, and only by careful budgeting can the economics of the alternatives be assessed.

This question of having to employ and house labour to increase the productive capacity of a farm beyond the one-man unit stage is a serious one from the point of view of national production. There are cases where a farm can be made into a full two-man unit, but for a number of reasons the farmer is unwilling to house and employ the necessary additional labour unit. There are also the cases where production can be raised, but not to the point where two full-time labour units are required. In these cases, if no labour is employed, from the national point of view latent potential is left untapped.

A study of one farm cannot be expected to show up all the problems associated with developing hill country, but it appears:—

1. At present it should be possible to develop economically considerable areas of hill country from surplus farm revenue.

2. In most cases where resources are limited and development is being done from surplus revenue raising of the carrying capacity cannot be rapid.

3. Taxation concessions to farmers should be some stimulus to land improvement on hill country.

4. Sympathetic administration of mortgages is a requisite to sound development of hill country.

5. The problem of increasing the carrying capacity of a hill farm beyond the limit of one labour unit is a major one in many private land development projects.

## Poultry Keepers' Course of Instruction

A COURSE of instruction for both commercial and household poultry keepers will be held at Massey Agricultural College on 5, 6, and 7 February.

Copies of the programme of the course will be supplied on request by secretaries of poultry clubs, by the Registrar of Massey Agricultural College, Private Bag, Palmerston North, or by the Secretary, New Zealand Poultry Board, P.O. Box 379, Wellington.

A similar course of instruction will be held at Canterbury Agricultural College, Lincoln, in May.

# Feeding and Management of the Sow and Litter

By D. M. SMITH,
Research Officer, Department of Agriculture's Ruakura Animal Research Station, Hamilton

PIGS on the dairy farm can pay handsome dividends. Surveys of pig-meat production and costs conducted in 1951 and more recently have shown that good farmers are netting 6d. from each gallon of milk fed to pigs and that the average return for all the farms surveyed was 3½d. With whey the best farms netted 2.3d. per gallon of whey fed and the average was 1.7d. These returns are not beyond the reach of any farmer, but to achieve them each gallon of separated milk or whey must be used sparingly so that its full value is realised.

UNDER New Zealand conditions of seasonal dairying this is not easy, but it can be done and is being done successfully on many farms by:—

1. Keeping sufficient sows to provide enough pigs to consume all the milk available throughout the season.
2. Planning farrowing in relation to the calving time of the dairy herd.
3. Obtaining the maximum returns from each sow by proper mating methods, adequate feeding while dry, and, while feeding the litter, by good litter management and by good housing.

## 1. How Many Sows Should be Kept?

Since separated milk or whey is the basic feed of most New Zealand pigs, the number of sows kept on any farm must be related in some way to the number of cows in the herd or their production. It has been customary for many years to recommend a ratio of sows to cows, the ratio varying according to the class of output—pork or bacon production—and the basic feed supply—milk or whey. The ratios in Table 1 have been suggested.

HEADING PHOTOGRAPH: A sow in ideal farrowing condition.

TABLE 1—SUGGESTED RATIOS OF SOWS TO COWS

| Type of feed | Type of production | |
|---|---|---|
| | Mainly pork | Mainly bacon |
| Skimmed milk .. | 1 sow to 8 cows | 1 sow to 10 cows |
| Whey .. | 1 sow to 12 cows | 1 sow to 15 cows |

This system of deciding how many sows should be kept is merely a guide and can hardly be accurate when applied to individual farms, since herds differ substantially in production per cow. It has, therefore, been suggested that a more accurate method of deciding the sow capacity of a farm would be to keep one sow for a specified production of butterfat. This system again is too general, since the yield of separated milk from each pound of butterfat sent to the factory varies considerably according to the average test of the herd.

In Table 2 the effect of fat test on milk yield is shown and from this the sow potential of the feed supply has been calculated for four types of production. The same amount of milk for calf feeding has been subtracted from all of the yields and it has been assumed that 25 per cent. of all feed is meal or crops.

The yields of skimmed milk shown and the sows carried are both per 10,000lb. of butterfat produced.

## 2. Planning the Farrowing Times

Under the system of grassland dairy farming practised in this country the cow carrying capacity of a farm is determined almost entirely by the number of stock that can be fed through winter. Apart from the increase in appetite of a relatively few young stock as the season advances the feed capacity of the herd is fairly static despite a terrific increase in available feed. By comparison the pig herd is at a distinct advantage. Both numbers and appetite change considerably throughout the season. A farm running 5 sows can have as few as 5 head of stock on hand at the commencement of the season and 40 to 50 head 2 months later. The appetite of the individuals will double in 2 months and treble in 4 months.

Farrowing times should be planned to fit these changes in stock numbers and appetite to the rising or falling milk or whey supply from the dairy herd. For example, on a dairy farm

TABLE 2—SOW POTENTIAL OF FEED SUPPLY FOR FOUR TYPES OF PRODUCTION

| Average fat test of herd | Yield skimmed milk gals. per 10,000lb. of fat | No. of sows to keep when production is | | | |
|---|---|---|---|---|---|
| | | All bacon | ½ bacon | ¼ bacon | All pork |
| 4.0 .. .. .. | 22,500 | 3 | 4 | 5 | 6½ |
| 4.2 .. .. .. | 21,300 | 3 | 4 | 5 | 6 |
| 4.4 .. .. .. | 20,200 | 2⅔ | 3⅔ | 5 | 6 |
| 4.6 .. .. .. | 19,200 | 2⅔ | 3⅔ | 4⅔ | 5⅔ |
| 4.8 .. .. .. | 18,300 | 2⅔ | 3 | 4 | 5 |
| 5.0 .. .. .. | 17,500 | 2 | 3 | 4 | 5 |

where 40 cows are milked averaging 300lb. of fat per cow from milk of 4.8 per cent. test, cows calving in July and August, the sow numbers and farrowing times in Table 3 would give satisfactory results.

**TABLE 3—FARROWING TIMES OF 5 SOWS ON A 40-COW FARM, COWS CALVED JULY AND AUGUST**

| Sows | Farrowing date early litter | Farrowing date second litter |
|---|---|---|
| A .. | Early May | Late October |
| B .. | Mid-May | Early November |
| C .. | Late June | Mid-December |
| D .. | Early July | Early January |
| E .. | Early July | Early January |

The important feature is that the first sows farrow down 6 weeks to 2 months before the first cows calve. Two litters, the June litter and one of the July farrowings, would be marketed at bacon weights in seasons of normal dairy production, but actual marketing times and weights can be varied according to feed supplies.

Under this system meal supplements, grass, and crops would be fed to the early farrowing sows and meal to all weaners for the first month after weaning. The effect of maintaining a reasonable level of nutrition to the litters weaned in the early part of the season is that these pigs grow economically over the period of relative milk shortage and are large enough to consume the flush later in the season without overfeeding.

The second litters of the season are faced with a falling milk supply at a time when the October and November farrowed pigs are starting to consume an appreciable quantity of milk. By marketing baconers at this time, say four at a time, the 24 gallons that these baconers would consume is sufficient to supply 24 lighter pigs with an extra gallon per day. When these October and November farrowed pigs are marketed as pork at the end of January the remaining litters are then left to consume the available supply. By farrowing sows at the correct times there is no excess of milk at any stage during the season. On the other hand, where necessary, meal supplements are used to maintain a continued economic growth-rate.

## 3. Obtaining Maximum Returns from All Sows

### Efficient Mating

Most New Zealand farmers allow the boar to run with the sow herd through the mating period and through the dry period. This system entails little work, but suffers the disadvantage that matings often pass unnoticed. When matings are not seen farrowing dates become a matter of guesswork and planned farrowing is impossible.

The ideal method is hand mating. The boar is housed separately over the mating period and the sow is taken to the boar once each day of the heat period, which usually last 3 days. The mating dates can then be entered on a shed sheet and a special note made to check each sow 18 to 21 days after the previous mating. It has been suggested, as a result of overseas research, that the most effective time to mate a sow is 12 to 36 hours after the beginning of heat. Close observation of some hundreds of sows at Ruakura has shown, however, that some sows remain in season for only 12 hours; so any attempt to hold sows from the boar for the first 12 hours may result in a missed mating.

Probably the most practical mating system is to house the boar and the sows separately at night and allow them to pasture together during the day. Under these conditions the boar can be well fed more easily while mating is in progress and he will examine the sows under the farmer's eye when let out each morning and immediately mate any female ready for service. The mating can be noted and entered on a shed sheet. Should any sow have a short heat period, she will be adequately mated under this system.

The mating programme is relatively simple with sows that have had one or more litters. A sow weaning a litter at 8 weeks will normally come in season within a week of the removal of the litter. Once sows have been farrowed down in rotation they will wean and be mated in that same rotation as long as each is settled at the first service. Where gilts are being brought into the herd, however, more care must be taken, since the order and time of farrowing once established is difficult to change.

Gilts should be about 8 months of age when first mated and should weigh at least 220lb. liveweight. Most gilts will come in season at about 7 months of age and, as with older sows, subsequently repeat the performance at intervals of 18 to 25 days. It has been found that the second and third heat periods of maiden gilts produce more eggs for fertilisation than the first. It is therefore an advantage to miss the first heat and, if possible, the second in order to obtain larger first litters.

Since the aim is to farrow as near as possible to set times, some sort of system must be used in the initial mating. The following will give satisfactory results. It is assumed that five gilts are to be mated, two to farrow in May, one in June, and two in July.

(a) House the boar separately at night.

(b) Let the boar out with the gilts each morning from 11 January until two have been successfully mated.

(c) House the mated gilts and the boar separately from the remainder until 8 February. He should be allowed to mate one gilt and then be removed together with this gilt until 12 March when he is allowed to mate the remaining sows.

(d) It is advisable when mating gilts to keep one or two extra. These should be mated to farrow one in June and one in July in case one or more fail to get in pig at the first service. If not required later, they can usually be sold profitably.

### Feeding the Dry Sow

There is little point in starting a planned farrowing programme at the gilt stage and then not keeping to the timetable through sows failing to get in pig promptly after weaning.

A sow will normally come in season any time during the first week after removal of her litter. She should be mated at this time. It is common practice on many farms to turn newly weaned sows out to pasture and let them run with the boar until they appear to be close to farrowing. This system of sow management is very inefficient in relation to a planned farrowing schedule. Recent surveys have shown that on average farms farrowings are spread over the whole year, almost equal numbers being farrowed in each of the 12 months. There is little doubt that this situation has developed through faulty sow nutrition, especially during the critical month after weaning.

A mature sow suckling a litter of 8 pigs may lose 80lb. to 100lb. liveweight during the 8 weeks of her lactation. She is therefore low in condition when mated a week later and if fed nothing but pasture will remain in low condition indefinitely. Adequate feeding for such a sow is 6 gallons of milk per day and this level should be maintained for a month after the litter is weaned. If the sow fails to hold to the first service 7 days after weaning, she should then be sufficiently improved in condition to hold successfully to the next mating 3 weeks later.

The ration during the second month will depend on the pasture available and the condition of the sow. Four gallons of milk plus grass should be adequate if the sow is still somewhat poor, and 2 gallons is sufficient for those that have responded well to the initial post-weaning feeding period.

During the third month of pregnancy good pasture is sufficient to maintain and even slightly increase the body-weight of many sows.

The last 3 weeks before farrowing is again critical, as it can affect the weight of the litter at birth. Sows that have regained weight rapidly after weaning and thrived thereafter will not be greatly influenced by the level of feeding over this pre-farrowing period, but those still low in condition will. A sow in ideal condition is shown in the heading illustration.

Research work at Ruakura has shown the effect of sow nutrition dur-

ing pregnancy on the average birth-weight of piglets. The results of a trial in which one group of sows was run on grass alone and the other group adequately fed throughout gestation are shown in Table 4.

**TABLE 4—TRIAL WITH SOWS ON GRASS ALONE AND SOWS ADEQUATELY FED THROUGHOUT GESTATION**

| | Treatment | |
|---|---|---|
| | Grass alone | Grass and supplements |
| Number of sows .. | 10 | 10 |
| Number of pigs per litter .. .. | 8.3 | 8.6 |
| Average birth-weight per pig .. .. | 2.4lb. | 2.8lb. |

The birth-weight of a piglet is extremely important in relation to its chances of survival. Fifteen per cent. of all pigs born on New Zealand farms are born dead or die soon after birth. Any measures that can be taken to reduce these losses can, therefore, help materially in increasing the meat output per sow. Records collected at Ruakura show the relationship between birth-weight and still births:—

**TABLE 5—RELATIONSHIP BETWEEN BIRTH-WEIGHT AND STILL BIRTHS**

| Weight of pigs | No. of pigs | No. born dead | Per cent. born dead |
|---|---|---|---|
| lb. | | | |
| 0.5 to 1.5 .. | 88 | 28 | 31 |
| 1.6 to 2.5 .. | 691 | 51 | 7 |
| 2.6 to 3.5 .. | 997 | 53 | 5 |
| 3.6 and over | 127 | 2 | 1.5 |

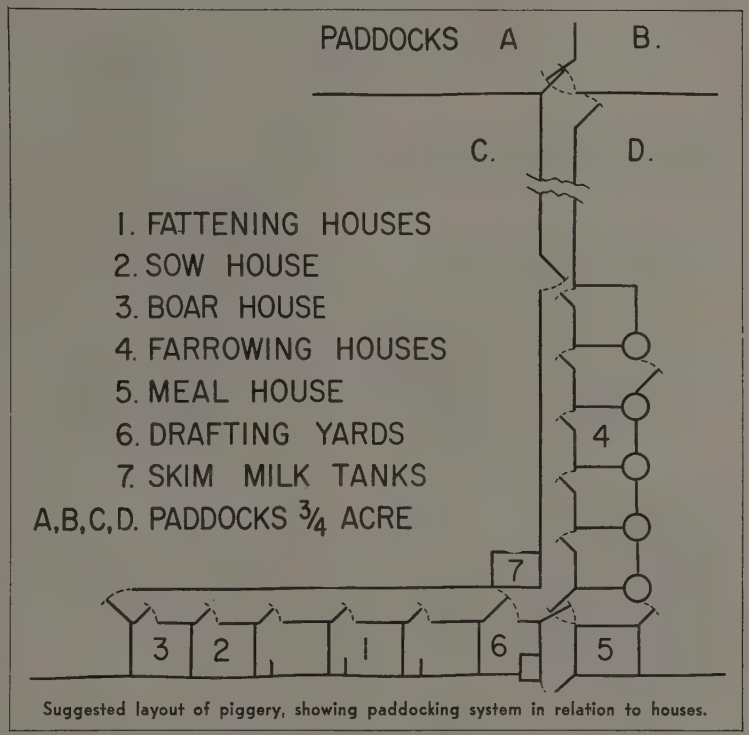
It is evident that the larger the piglets are at birth the greater is their chance of survival. In addition the birth-weight of a pig influences its 3-weeks weight and weaning weight. Records given in Table 6 from a sample of approximately 200 litters at Ruakura serve to show the relationship of birth-weight, 3-weeks weight, and weaning weight.

**TABLE 6—RELATIONSHIP OF BIRTH-WEIGHT, 3-WEEKS WEIGHT, AND WEANING WEIGHT**

| Weight at birth | Weight at 3 weeks | Weight at 8 weeks |
|---|---|---|
| lb. | lb. | lb. |
| 1.5 to 2 .. .. | 8.6 | 33 |
| 2 to 3 .. .. | 10.3 | 38 |
| 3 to 4 .. .. | 13.7 | 46 |

It should be noted that grass is recommended as a key part of the ration of the dry sow throughout the whole dry period. Though it has been emphasised that a diet of pasture alone is inadequate, especially for the first month of pregnancy, it can serve as a very useful addition to milk, whey, meal, or crops. Unfortunately, on many farms pig paddocks receive little care and attention and little attempt is made to manage the swards in a fashion similar to dairy pastures so that adequate pasture of high quality is available.

It is possible to establish and maintain high-producing clover-ryegrass pastures on the piggery if a few simple rules are observed. Sows, litters, or fattening pigs should not be allowed out on pastures during very wet weather. Where no control is exercised and pigs are allowed to wander the usual result is excessive pugging, a loss of clover through tramping, and an opening up of the pasture, leading to clumpy, fibrous ryegrass which is highly unpalatable. If, on the other hand, the layout and housing are arranged as shown in the illustration on this page to provide for paddocks of ¾ to 1 acre and houses are provided with enclosed feeding yards, successful management is relatively simple. In such a layout the stock can be kept off the pastures when necessary or they can be grazed extensively in summer or intensively in spring by using the electric fence. Paddocks are large enough to allow the use of harvesting machinery should the early summer growth exceed the grazing capacity of the pigs; topdressing is easy and the areas are large enough to crop.



Suggested layout of piggery, showing paddocking system in relation to houses.

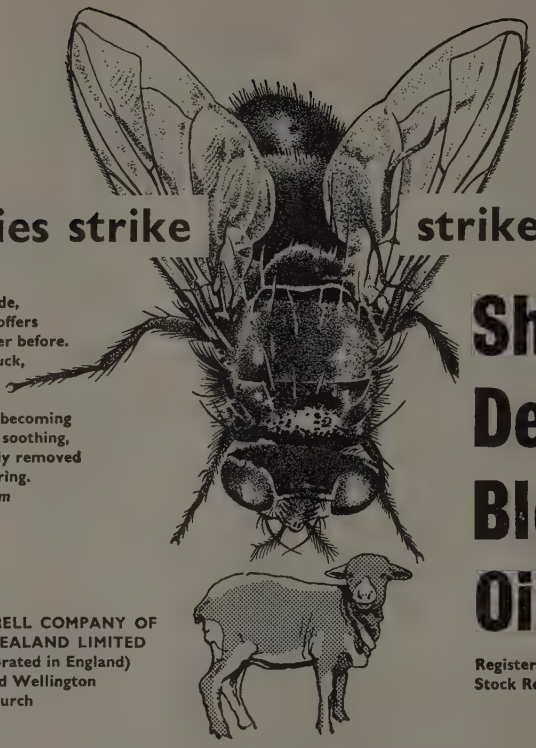
On a relatively small area of the farm (½ acre per sow kept) by the maintenance of a vigorous, well-balanced pasture and by management of this pasture with the same care and attention as are bestowed on the dairying area, grass can help materially to reduce the piggery feed costs and at the same time improve the health of all classes of stock.

## Care of the Sow at Farrowing

The sow should be put in her farrowing quarters a fortnight to 3 weeks before she is due and fed at the rate of 4 feed units per day. She should also be allowed access to pasture. Most animals are inclined to become constipated as the end of pregnancy approaches. For this reason ½lb. of bran or ½ pint of molasses every second day should be fed as a precautionary measure.

The average length of pregnancy for pigs is 114 days, but some sows will farrow at 112 days and others will carry their litter to 120 days without any ill-effects. As farrowing approaches, the udders become distended and a few hours before the first pig is born milk can be drawn from the teats. Up to 12 hours before farrowing commences the sow will start to make a nest by carrying grass, sods, and even sticks into the house. She will arrange and re-arrange this material up to the time that labour pains start. It is seldom necessary to interfere with the normal farrowing process and, if the programme shown below is followed, a satisfactory farrowing and survival of the litter should result.

1. Provide a light liquid feed for the sow—2 gallons of milk is sufficient. Provide an ample supply of water.
2. Provide clean, dry bedding—chaff or shavings are probably the best materials—but a small quantity of straw is satisfactory. Hay is seldom satisfactory.



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3. Erect some form of barricade to stop the newly born piglets from wandering out of the house.
4. Supply some form of heat lamp in a railed off enclosure where the piglets can retire for warmth and safety.
5. Do not disturb the sow until she has passed the afterbirth. Then drive her out to pasture and leave her out for ½ hour. She will usually move about the paddock and dung and urinate. When she is let back into the pen she will normally have a feed and then retire to feed her piglets.
6. While the sow is out of the pen clean the house and replace the soiled bedding with clean material.

On the first day after the sow has farrowed 6 feed units should be fed. From then on the ration should be built up quickly to a level based on the number of piglets being reared.

## Housing the Sow and Litter

The basic housing requirements of the sow and litter are dealt with fully in the Department of Agriculture Bulletin No. 374. In this bulletin the round farrowing house, which has proved most satisfactory at Ruakura, especially in reducing losses from overlaying, is described (see the illustration below. On many farms sufficient accommodation is already provided for the number of pigs kept. In such cases it is suggested that conventional 8ft. x 8ft. houses can be adapted satisfactorily to provide all the essential features of the round house. The modification is shown in the illustration on page 55.

Ruakura round farrowing house, which helps appreciably in reducing losses from overlaying.

## Feeding the Suckling Sow

Sows should be fed a daily ration based on the number of pigs suckled. Table 7 provides a guide, but the quantities listed should be increased if the sow is obviously losing too much weight. (One feed unit is 1 gallon of skimmed milk or 1lb. of meal.)

TABLE 7—DAILY RATION OF SOWS IN RELATION TO THE NUMBER OF PIGS SUCKLED

| Number of pigs | Feed units per day |
|---|---|
| 4 to 6 | 6 |
| 7 to 9 | 10 |
| 10 to 12 | 12 |

These rations can be fed in 2 feeds per day.

## Good Litter Management

Once the litter has been successfully farrowed and has survived the first week the aim should be to achieve a high weaning weight per pig. A reasonable growth performance of a suckling pig under New Zealand conditions is shown in Table 8.

TABLE 8—GROWTH PERFORMANCE OF SUCKLING PIG

| Age weeks | Weight lb. | Age weeks | Weight lb. |
|---|---|---|---|
| 0 | 2.8 | 5 | 21.7 |
| 1 | 5.4 | 6 | 27.3 |
| 2 | 9.2 | 7 | 34.3 |
| 3 | 12.8 | 8 | 42.5 |
| 4 | 16.7 | | |

For the first 2 weeks and for most of the third week the litter is almost entirely dependent for food on the sow's milk supply. Beyond farrowing the sow down in good condition and feeding her well the farmer can do little to influence the weight of the pigs at 3 weeks, apart from guarding their general health and thrift. There are three major problems likely to be encountered during the first 10 to 21 days of the piglet's life:—

1. **Piglet anaemia:** Sows' milk is devoid of iron and copper, but both these elements are necessary for the formation of the red corpuscles of blood. At birth the piglet has a small store of these two elements in the liver, but only sufficient to last for 1 or 2 weeks. If no further supply is made available, a severe form of scours develops and death can result. Severe setbacks to growth are quite common as a result of anaemia in

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young pigs. To guard against this deficiency the litter should be run out on pasture as early as possible in the first week of life and at least once a week thereafter. When let out the young pigs eat quite appreciable quantities of soil which will contain sufficient iron and copper to keep them healthy.

2. **Bacterial scours:** Scours can be caused by a number of different bacteria, some of which are very severe in their effects. If growth setbacks are to be minimised, it is essential to treat scouring pigs as soon as the trouble is detected. It is a wise precaution to treat the whole litter once a pig within that litter has shown that an infection is present. For treatment methods and materials the farmer should consult his veterinary surgeon and if possible obtain through him a supply of the drugs prescribed so that future treatment can be prompt.

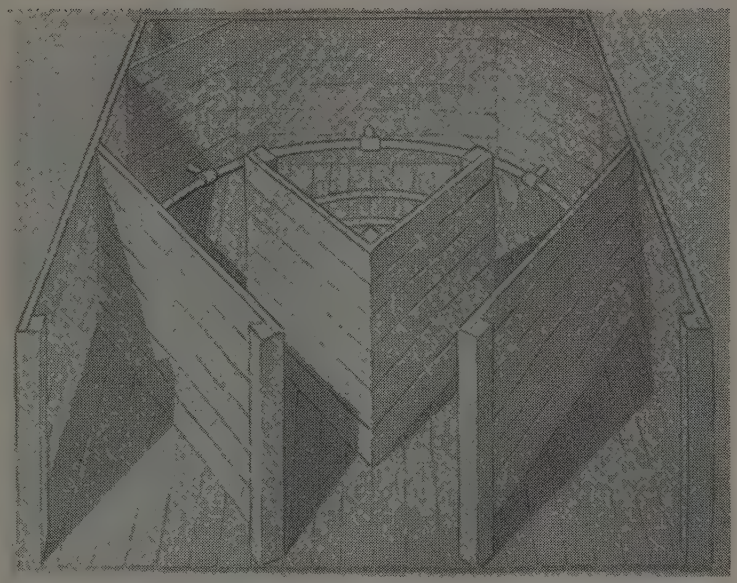
3. **Arthritis:** This disease can have disastrous results on the growth-rate and survival of a litter if not dealt with promptly. Piglets may become infected through the navel or through abrasions on the knees and hocks developed while suckling the sow on slippery board floors or abrasive concrete. The best way to deal with this trouble is to prevent it by keeping the farrowing quarters as clean as possible and by using a deep layer of bedding. At Ruakura shavings have proved extremely useful in preventing the knee and hock abrasions so prevalent where little or no bedding is used. For treatment the same advice applies as for bacterial scours.

## Creep Feeding

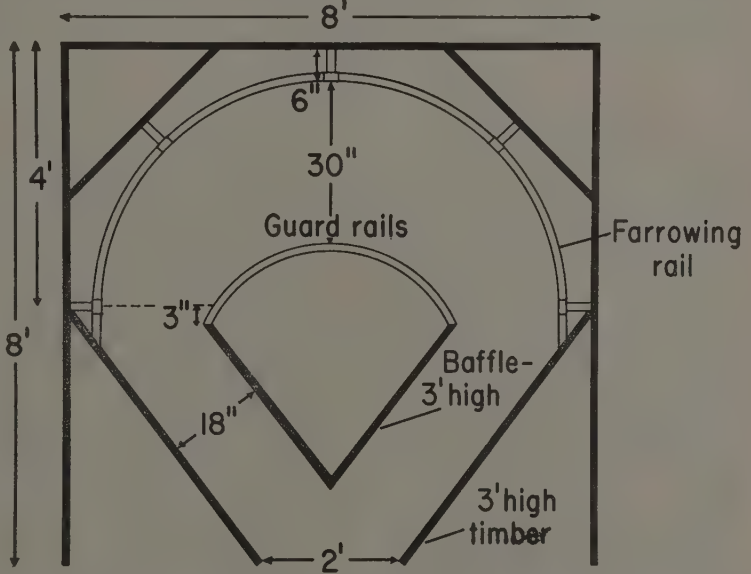
The sow's milk production reaches a peak in the third or fourth week and from then on declines. As the milk supply falls the piglets seek additional feed and this should be provided in a suitably railed-off area in the farrowing unit.

First-litter sows reach the peak of their milk production somewhat later than mature sows and for this reason it is often difficult to interest their litters in supplementary feed until the fifth or sixth week. The relationship between the sow's level of milk production and the creep intake of the litter is illustrated on page 56. The important features of creep feeding are:—

1. Start the piglets as early as possible on their supplementary feed. By placing meat meal or small knobs of tallow or commercially produced pellets on the floor of the pen while the sow is out grazing it is usually possible to persuade a litter to start eating small quantities of creep feed at a very early age. Their intake up to 3 weeks will be negligible, but through an early introduction to the feed they automatically increase their consumption once their appetite outstrips their dam's milk supply.

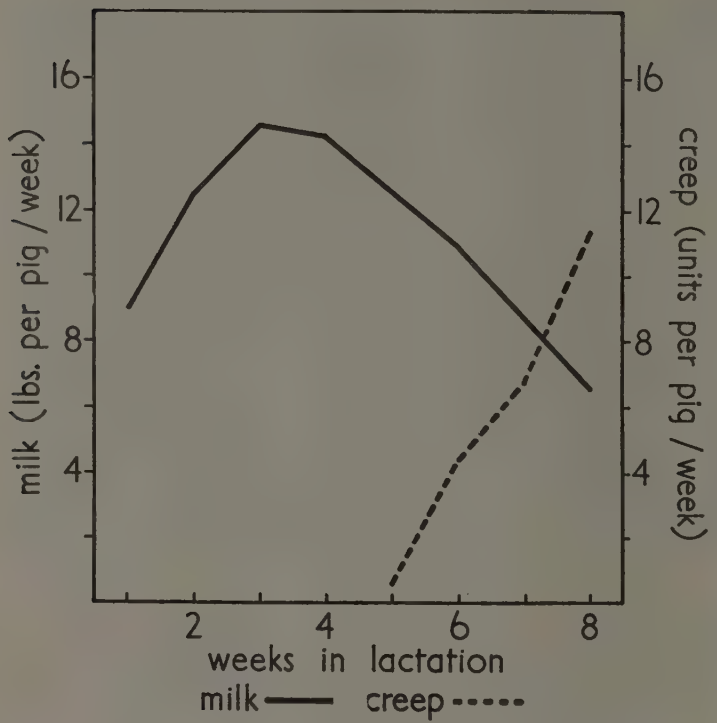


An adaptation of a conventional 8ft. x 8ft. house to satisfy all the requirements of the round farrowing house.




2. Observations of litter behaviour at Ruakura have shown that piglets of 6 to 7 weeks of age will visit the creep and eat from it after every suckling. Since the litter suckles the sow at about 1½-hour intervals day and night, the piglets visit the creep about 16 times in 24 hours. It is therefore essential to have supplementary feed available at all times. Probably the easiest way to achieve this is to use a hopper type self-feeder which will hold 7 to 14 days' supply.

3. Since the pigs must eventually live entirely on skimmed milk, they should be introduced to this feed while on the sow. By the time a litter is 5 weeks old it will usually start drinking milk from the sow's trough. If the sow is fed twice a day, the piglets can obtain a reasonable quantity of milk from this source. The




The consumption of meal from the creep increases as the milk yield of the sow declines.

advantage of this system is that all the milk fed at each feed is eaten and the trough is cleaned out by the sow. Where a small trough is used in the creep to start the piglets drinking, the milk will seldom be completely consumed within the day. To avoid excessively sour and rotten milk the residue should be emptied out every day and the trough washed. Since this practice is laborious and is often neglected, with disastrous results on the litter, it is preferable to allow the piglets to establish the habit of drinking milk from their dam's trough and provide an additional supply in the creep over the seventh and eighth weeks.

4. The lactating sow can obtain a useful amount of feed from pasture. Grass is equally important as a source of vitamins which are passed on to the litter in the sow's milk. Similarly, the piglets will consume a significant amount of young leafy grass and clover between the fifth and eighth week of suckling, thus adding to their vitamin supply. For this reason farrowing houses should be built with grass runs attached. Observations of sow and litter grazing habits have shown, however, that uncontrolled access to pasture has severe disadvantages. When sows and litters are let out of their pens first thing in the morning they will graze effectively for about an hour. After this they tend to root holes in the paddocks or renew old wallows in an attempt to keep cool. To assist in pasture management, therefore, and since their effective grazing period is finished, the pigs should be returned to their pens and locked in.

A further reason in favour of this practice is that the litter will remain with the sow in the paddock as long as she is at large. They will suckle her there, but will seldom return to the pen to eat at the creep. Since the aim should be to encourage the litter to eat as much as possible from the creep, prolonged periods out at pasture should be avoided.

## Castration

Boar pigs are best castrated while they are still suckling the sow. A good age is 3 to 6 weeks. The animals being small the operation is easier to carry out then than later and recovery is more rapid if the piglets are still on the mother. Castration is an operation which can be learnt best by demonstration and practice. The procedure is described and illustrated in Bulletin No. 230, "Castration of Pigs", which is available free from any office of the Department of Agriculture.

Faulty castration, resulting in the development of abscesses at the site of the wound or in nearby glands, causes considerable loss to the industry. Piglets may die from the result of infections or at best produce carcasses which ultimately are condemned at slaughter. Cleanliness in carrying out the operation, cleanliness of quarters to which the pigs are returned after castration, and efficient execution of the operation are essential for successful results.

All boar pigs intended for fattening must be castrated to be acceptable as pork or bacon carcasses.

## Weaning

Under ordinary circumstances pigs should be weaned at 8 weeks of age. The sow is usually ready for mating within the following week and will farrow her next litter within 6 months of the previous one, thus providing for 2 litters per year. It is recommended that the sow be removed and the litter left in the farrowing quarters for at least a week. The aim is to avoid any check to growth by shifting the piglets to strange quarters at the same time as they are subject to the change of feed occasioned by the removal of the sow.

With pigs as with other livestock it is always advisable to avoid rapid changes in management and feeding and for this reason it is recommended that meal be fed to weaned pigs in a gradually decreasing amount over the month following weaning to make sure that no growth checks occur. Recently, methods of feeding piglets weaned from the sow at 7 to 10 days of age have been devised. This involves a re-organisation of both farrowing times and sow numbers. Details of this system are published in Departmental Bulletin No. 389, "Early Weaning of Pigs".

## Key Points of Management

1. Relate the number of sows kept to the output of the dairy herd so that sufficient pigs are available to consume the milk supply.
2. Farrow sows at the correct time in relation to the calving time of the dairy herd so that the number and appetite of the pigs can be fitted to the dairy production.
3. Feed the newly weaned sow well to ensure a successful early remating.
4. Make use of pasture in feeding the dry sow.
5. Feed the lactating sow according to the number of pigs suckled.
6. Use suitable farrowing accommodation to help reduce losses.
7. Have supplementary feed available to the litter at all times.

# Grassing Down of Orchards in Auckland District

**FOR many years in the Auckland Province there has been a spasmodic interest in grassing down of orchards with a mixture of grasses and clovers That interest has intensified in recent years because fruit growers have become concerned about soil erosion and deterioration in soil structure. In this article H. A. Prew, Horticultural Instructor, Department of Agriculture, Tauranga, discusses conditions, grass and clover seed mixtures, and advantages and disadvantages of this type of culture.**

THE gum soils of the Auckland orchard lands are mostly shallow clay loams overlying heavy clay subsoils and are not easy to work. The most common cultural practice in the district has been clean cultivation from spring to early autumn and a lupin cover crop or volunteer weed growth in late autumn and winter. The comparatively high rainfall in the Auckland district results in considerable soil erosion. Much of the land is of low natural fertility with poor texture and poor crumb structure. Drainage of heavy clay soils is difficult and in some instances appears to have become more difficult under regular cultivation.

A vista photographed in October of an orchard which was grassed down the previous autumn. Grassing down makes working conditions much more pleasant.

## Experience of Grassing Down

In past years a few fruit growers have grassed down parts of their orchards, but have reverted to cultivation after initial setbacks, possibly owing largely to a lack of understanding of cultural requirements.

More recently there have been further overseas studies of permanent grassing and a considerable amount of information has been published.

Because of the soil erosion problem and the unsatisfactory condition of soils under cultivation a number of Auckland fruit growers have again become very interested in trying out grassing down of at least parts of their orchards and have been encouraged by officers of the Horticulture Division, Department of Agriculture, to lay down trial blocks. Some of the growers have followed the accepted modern practices in grassing down and maintenance of sward, but in other instances the methods have been different.

Horticultural Instructors have been very interested in observing the effects of grassing down under different conditions and the following are outlines of some of the experiences to date.

1. A mature orchard in some of the heavy clay gumland had been kept cultivated until several years ago. The grower then sowed down the whole area with a mixture of subterranean clover and Italian ryegrass, but has not kept the sward mown. The clover and ryegrass produced a large quantity of green material, but weeds have been equally vigorous and have not been kept in check in any way. The only control of the cover in this instance has been by "knocking down" with heavy harrows at intervals, principally when the growth has become too long for convenient working in the orchard.

The general effect appears to have been rather unsatisfactory and tree growth of peaches in particular appears to have been definitely retarded. Plum and apple trees are in reasonably satisfactory condition, but this type of management of grass and clover cannot be recommended.

2. A block of pear trees on a rather better type of clay loam overlying a clay subsoil had been somewhat neglected for a number of years. About 12 years ago these mature trees were taken over by another grower and the orchard was sown down in perennial ryegrass and white clover.

The pasture has never been mown, but at irregular intervals cattle and sheep have been allowed to graze between the trees. At other times the pasture has been allowed to grow unchecked.

In addition to grassing down general culture in the orchard has been greatly improved. The trees are thriving and production has increased very considerably.

It appears from the condition of this block that the orchard has been improved to about the same extent as could have been expected under clean cultivation, even though the management of the pasture has not followed recognised practices.

3. About 14 years ago a citrus orchard was planted in the Warkworth district on land which had been in pasture grazed by stock for many years. Planting holes were dug for the trees, but no other cultivation was done. The grass has been kept mown regularly and the general appearance and production of the block is very satisfactory.

4. Three years ago a grower in the Henderson district sowed down a mixed orchard with the following grass mixture:—

| | Per acre lb. |
|---|---|
| White clover | 4 |
| Red clover | 4 |
| *Lotus uliginosus (major)* | 4 |
| Certified Italian ryegrass | 4 |
| | 16 |

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The soil is a mature peat overlying clay, but the water-table is fairly high and the area has had to be drained.

The grass and clover sward has been mown regularly with a rotary grass cutter and is comparatively free of weeds and is now predominantly clover.

General orchard practice has been improved since the land was grassed, and production from the orchard has steadily improved each year. The ages of the trees vary from 1 year to over 40 years, the majority being mature trees. Sward management has been particularly good, and this combined with improved general management of the orchard and the fact that the soil does not dry out seriously in summer has brought excellent results. It seems doubtful if the improvement in crops could have been equalled had the orchard been kept in cultivation. Most of the trees in this orchard are apples and pears, but a smaller number of stone fruit and citrus trees also do quite well under these conditions.

5. In the Bay of Plenty on a free-draining volcanic ash soil type it has been the practice for a considerable number of years to maintain permanent grass in a number of citrus orchards. The practice has been to cultivate squares round the trees, to mow the grass regularly, and to use the clippings as a mulch under the trees. This appears to be a satisfactory procedure in this district, but it is doubtful if there is any need to cultivate under the trees.

6. A few citrus growers are now trying a different technique, sowing the orchards down with the following seed mixture:—

| | Per acre lb. |
|---|---|
| Perennial ryegrass | 10 |
| Short-rotation ryegrass | 5 |
| White clover | 4 |
| Red clover | 2 |
| Montgomery red clover | 2 |
| | 23 |

The whole of the area is sown and no cultivation is done around the trees. The grass is mown regularly with a rotary grass cutter.

In one instance a new lemon block in the Te Puke district was sown down in grass 2 years ago, when the trees had been planted 4 years, and a check block was left in cultivation for comparison. The progress of the trees in the grass area has been so satisfactory that the grower intends to sow down the check area next year.

It is the practice in the Bay of Plenty district to mow grass regularly at intervals of about 10 to 14 days during growth flushes and at longer intervals at other times of the year. In most of the older orchards fertilisers are applied to the cultivated area round the trees, but where there is no cultivation round the trees the fertilisers are broadcast.

## Grassing-down Trial

Horticultural Instructors have been studying the effects of permanent sward on peaches in a trial in a Huapai orchard. This is on gumland, but the land has a better than average clay loam topsoil overlying heavier clay. It is probable that the water-table is fairly high in this block, but the land is not badly drained.

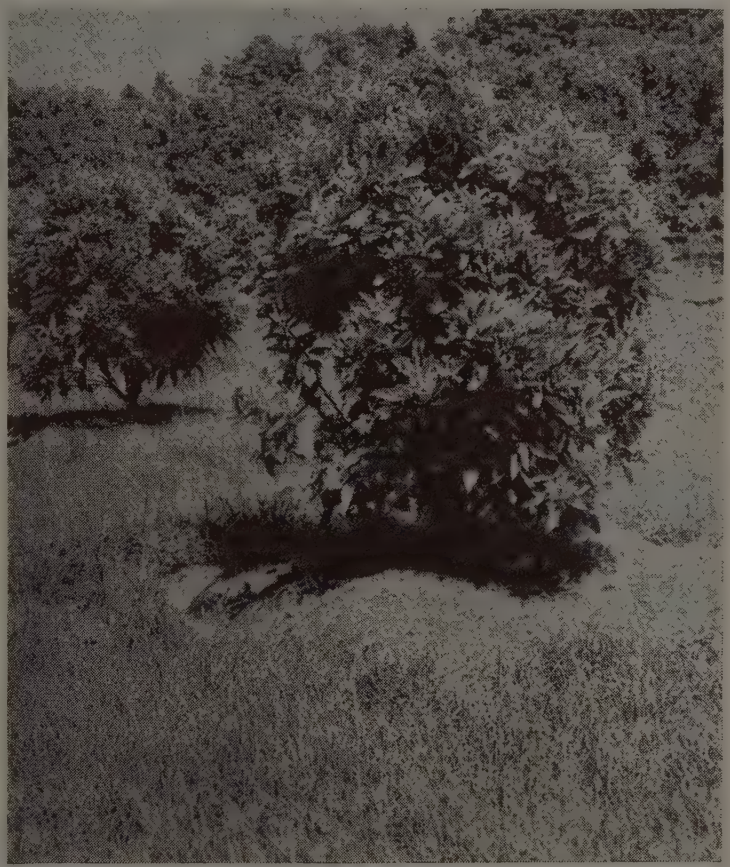
At the time the trial was laid down the total area of about 1 acre was planted in quinces and several varieties of peaches, all 6 years old. The block was divided into four plots, each having some peach and some quince trees. Three different grass mixtures were laid down in separate plots and the fourth plot was kept under normal cultivation as a check. The grass mixtures used per acre were:—

**Plot 1—Typical Sheep Mixture (Omitting Cocksfoot)**

| | lb. |
|---|---|
| Perennial ryegrass | 25 |
| Short-rotation ryegrass | 5 |
| Crested dogstail | 3 |
| White clover | 2 |
| Broad red clover | 2 |
| Subterranean clover | 3 |
| | 40 |

**Plot 2—Typical Mixture with High Proportion of Italian Ryegrass**

| | lb. |
|---|---|
| Perennial ryegrass | 15 |
| Italian ryegrass | 15 |
| White clover | 3 |
| | 33 |



A popular method of grassing down in the Bay of Plenty. Mulch has been placed under the trees.

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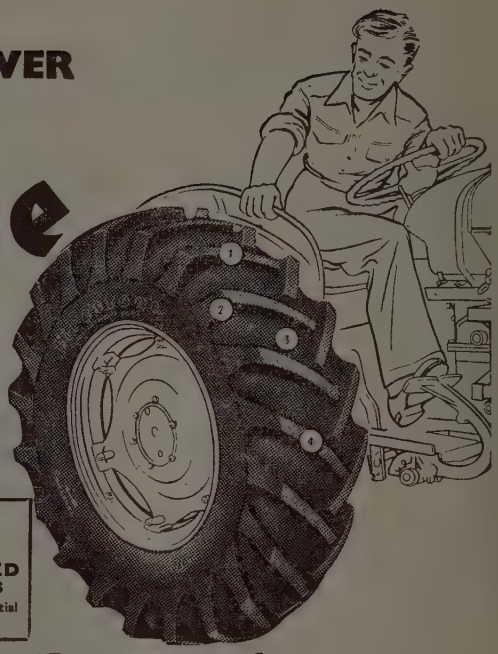

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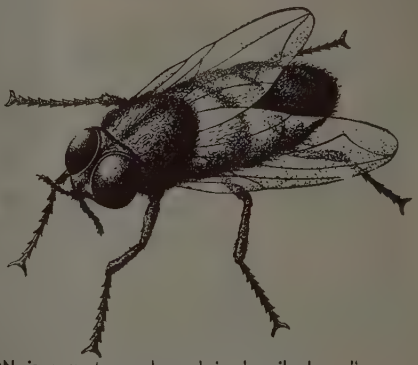

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Five-year-old Eureka lemons with pasture not mown. Better results could be expected from regular mowings.

Italian ryegrass, though of short duration, was included to help choke out annual weeds.

**Plot 3—High Proportion of Crested Dogstail**

| | lb. |
|---|---|
| Perennial ryegrass | 20 |
| White clover | 2 |
| Subterranean clover | 5 |
| Crested dogstail | 10 |
| | 37 |

Crested dogstail was included because it makes early spring growth and very little growth in summer. It was thought that by using crested dogstail there would be less competition between sward and trees for soil moisture during summer.

The grass and clover mixtures were sown broadcast in March 1951 and there was a very satisfactory germination of ryegrass. The strike of clovers was not very satisfactory, possibly owing to two factors—a rather low soil pH and a poorly consolidated seed-bed. Unfortunately, no roller was available at the time of sowing. Weed growth, principally of plantain, amaranthus, and spurrey, was very vigorous.

The initial fertiliser application was basic slag at 4cwt. per acre plus 1 ton of carbonate of lime in February 1951 before sowing down.

In August 1951 an "orchard mix" fertiliser was applied comprising:—

| | Per cent. |
|---|---|
| Blood and bone | 35 |
| Serpentine superphosphate | 35 |
| Sulphate of potash | 10 |
| Dried blood | 10 |
| Sulphate of ammonia | 10 |

(By weight of commercial fertiliser)

This was broadcast at 10lb. per tree on the grassed plots and 8lb. per tree on the cultivated plot. With grassing down it is well recognised that extra fertilisers must be applied to grassed areas in the early stages of establishment.

In August 1952 most of the area was treated with carbonate of lime at ½ ton per acre, but one section received no lime and on another section the rate was 1 ton per acre. These rates were based on pH tests and were intended to produce reasonably uniform conditions throughout the area. The same mixed fertiliser as was used in the previous season was applied over all blocks at 10lb. per tree, and additional dried blood at 3cwt. per acre was given to half the peach trees in each grass plot.

In 1953 12lb. per tree of the standard orchard mix fertiliser was given to all the trees with additional sulphate of ammonia at 3cwt. per acre to the peach trees which had received extra dried blood in 1952.

In 1954 the fertiliser mixture comprised:—

| | Per cent. |
|---|---|
| Superphosphate | 25 |
| Blood and bone | 20 |
| Sulphate of potash | 15 |
| Dried blood | 20 |
| Ammonium nitrate plus calcium carbonate | 20 |

(By weight of commercial fertiliser)

This was applied at 12lb. per tree in August. Additional sulphate of ammonia at 5cwt. per acre was applied to the peach trees receiving extra

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nitrogen. In addition, two foliar sprays of urea (6lb. to 100 gallons) were applied to the trees in all plots.

After about a year the differences in the growth from the three different grass and clover mixtures practically disappeared, the sward consisting of some prairie grass (*Bromus catharticus*) with a fair proportion of clover and minor proportions of other grasses and weeds.

The grass was mown with a small sickle-bar type mower at about 3-week intervals during spring and summer, but mowing was not always done regularly and at times the sward was allowed to grow as much as 10in. to 15in. high. Failure to control the strong-growing prairie grass more effectively has probably been largely responsible for the comparatively low proportion of clover in these plots.

Records of trunk girth measurements of both quince and peach trees have been kept. No differences in responses of the quince trees on the different plots were recorded, but increases in girth measurements of peach trees in the cultivated plot were always greater than increases in girths of the trees in the grass plots.

In 1953 all the quince block was under grass and was kept mown; consequently recordings of girth measurements were discontinued and the quinces left out of the trial because no check trees had been kept. The peach plots were also reorganised to eliminate all except two varieties, Wiggins and Buttercup, which were common to all plots and also because by that time there were no obvious differences between plots in the composition of the sward.

During 1951-52 it was apparent that the trees in the cultivated plot made more and better wood growth than that produced by the trees in the grassed plots, and though no records were kept, there appeared to be no doubt that the trees in the cultivated plot produced more peaches.

By the end of 1953 peach trees in the cultivated plot were still making more growth and apparently producing larger crops than those in the grassed areas, but there was no observable difference between the trees which had received extra nitrogen and those which had received only normal orchard mix fertiliser. It was apparent, however, that peach trees of the Buttercup variety were very much weaker than the Wiggins trees in all plots, particularly in the grassed-down area.

By the end of 1954 there was little change in the relative vigour of the trees in the cultivated and grassed areas and no apparent difference between trees receiving extra nitrogen and those receiving only the normal fertiliser applications. However, the grass in the area which had received extra nitrogen was in better condition. Crop records were taken by the orchardist in 1954 and results indicated that production from the cultivated plot was about 60 per cent. greater than from the plot to which extra nitrogen had been applied. The difference between the two grassed areas is probably not significant.

Young apple trees (foreground) and plum trees (background) in a sward which has not been mown for 3 years.

Early in 1955 the sward in the grassed-down area was showing the effects of a very dry season. The Wiggins peach trees were in excellent condition in all plots, but for the first time the effect of extra nitrogen was noticed in increased new wood growth, though neither of the grassed plots showed such good tree growth as did the cultivated plot. Buttercup peach trees were all in poor condition, but were worse in the grassed area than in the cultivated plot.

Though quince trees have been excluded from the trial, it is apparent that they have not suffered in any way through the effects of grassing down. The trees are still vigorous and are producing good crops.

From the observations made on this trial it appears that quince trees will thrive and produce good crops under the permanent grass system, but that there is considerable doubt with respect to peach trees. At least under the conditions prevailing in this trial, which are typical of many Auckland orchards, trees of strong-growing varieties such as Wiggins may do well in orchards sown down to grass provided sufficient extra nitrogen in the right form is applied, but observations so far suggest that they will not produce as heavy crops as trees growing in cultivated land. Weaker-growing trees such as Buttercup appear to be less suitable for growing under these conditions, at least until improved cultural practices can be devised.

It is hoped that this trial may be continued for a number of years with a view to checking on the ultimate effects of permanent sward on peach trees. Fertiliser practice will probably be varied to some extent in the future so that a more satisfactory mixture can be obtained.

In the meantime no recommendation can be made, though from observations made so far there appears to be every reason to believe that pip fruit and probably plum and citrus trees, at least in some soil conditions, can be grown satisfactorily in grassed-down orchards.

## Suggestions to Aid Grassing Down

Information recorded overseas and observations made in the Auckland

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district indicate that several points should be given attention by growers intending to grass down orchard land.

1. To establish a good sward it is essential that a well-prepared, firm seed-bed should be made, that the pH of the soil should be sufficiently high for satisfactory establishment of clover, and that initial preparation should reduce weed population as much as possible.

2. Regular and fairly close mowing of the sward should be done and particular attention paid to regular and frequent mowing during summer and early autumn, when there is likely to be competition between grass and trees for the small amount of moisture available in the soil.

3. The rotary grass cutter and the gang mower are the most suitable types of mower to use.

4. It is probable that at least in the first few years after an orchard is sown down to grass extra nitrogen will be required. Possibly this may be better applied in nitrate form such as an ammonium nitrate-calcium carbonate fertiliser or something similar rather than as sulphate of ammonia, which is suitable for grasses but has a depressing effect on clovers and is not, under grassed conditions, available to trees as readily as nitrogen in the nitrate form.

## Advantages

The advantages of grassing down are:—

1. It helps to control soil erosion.

2. It tends to improve soil structure and condition, thereby increasing moisture-holding capacity and aiding natural soil aeration and drainage.

3. It probably increases availability of plant foods, including trace elements, in the soil.

4. It provides a firmer and more even soil surface, facilitating movement of spraying and harvesting equipment, etc.

5. It makes working conditions much more pleasant, both in wet weather and dry weather.

## Disadvantages

Disadvantages of grassing down are:—

1. Competition for soil moisture between grass and trees in dry weather, particularly in the early years of development before organic matter is built up to any extent in the soil. This may be overcome to some extent by correct grass management and by irrigation if available.

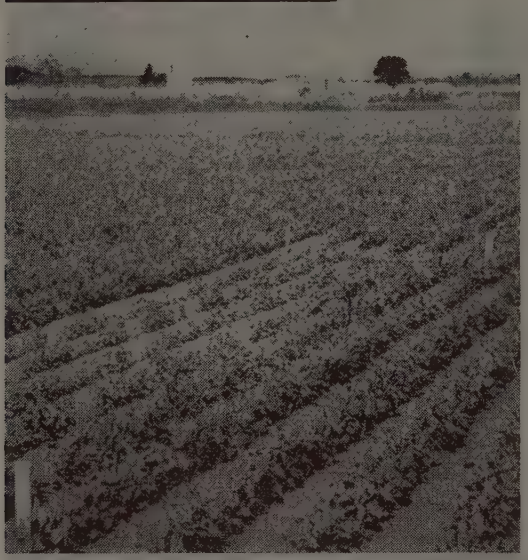
2. The probable need for additional nitrogen fertilisers, at least in the early years of establishment.

3. Greater liability of the blossoms and fruit to frost damage in grassed areas. This is not likely to be of very great importance in Auckland districts.

4. Other factors which must be taken into consideration, but which probably should not be called disadvantages, are the cost of changing over from cultivation to mowing equipment, which of course would not apply if a new orchard were sown down in grass, and the necessity for regular and frequent close mowing, especially during the dry periods of summer and early autumn. It is probable that regular attention to mowing is more vital than regular attention to cultivation would be.

In the experiment at Huapai it was found necessary to do mowing about twice as often as cultivation. This took about half the time and on account of the lighter work fuel consumption showed an over-all reduction.

Recent Research Work



# WEEDS IN PEAS AND CARROTS

**WEEDS often cause considerable losses of yield in crops. In some crops it is difficult to control weeds by cultivation, and since the development in recent years of selective weedkillers chemical control of weeds has become standard practice in the commercial growing of many crops. Some of these chemical methods are not entirely satisfactory, and as new chemicals become available trials are carried out to determine whether these are more suitable than the materials already in use. Results of trials conducted at the Department of Agriculture Rukuhia Soil Research Station, Hamilton, to determine the tolerance of crops to various weedkillers are described in these notes.**

## PEAS

FORMULATIONS of DNBP are commonly used for weed control in pea crops, but these materials are not entirely satisfactory. They are poisonous and precautions have to be taken to safeguard the health of the persons applying the materials. There is so little difference in the tolerance of the crop and the weeds to DNBP that the quantity to be applied, which varies according to temperature, has to be assessed accurately. The potassium salt of MCP is also used on peas, but again the margin of tolerance between peas and weeds is small.

Last season replicated trials with both pre-emergent and post-emergent applications were conducted on peas at Rukuhia. Both trials were on a light soil (Horotiu sandy loam). There were practically no weeds in the crop, even on the untreated plots, and therefore there was little difference in yield between the untreated controls and the hand-weeded controls. The peas were the Victory Freezer variety and were sown in December.

### PRE-EMERGENT APPLICATIONS

Each of the three weedkiller derivatives of urea—PMU, CMU, and DCMU—was applied at 1½lb. and 3lb. per acre the day after the peas were sown.

PMU (2300 parts per million (p.p.m.) soluble in cold water), which is the most soluble of the three materials, caused very severe damage to the crop, particularly at 3lb. per acre. DCMU is the least soluble (42 p.p.m.) and caused no damage at all. CMU, which is intermediate in solubility (230 p.p.m.), was also intermediate in crop damage. It decreased the yield of peas when applied at 3lb. per acre, but caused no damage at 1½lb. per acre.

There was no sign of any of the materials affecting the crop until a few days after a fall of about 1in. of rain when the peas were 3in. high. The PMU plots were obvious by their shorter growth and yellowish colour and the CMU 3lb. per acre plots were very slightly retarded.

It appears that PMU moves through the soil so readily that it would not be safe for use for weed control in crops under New Zealand conditions. The value of CMU or DCMU would depend on the soil texture and the rainfall.

### POST-EMERGENT APPLICATIONS

In this trial formulations of MCPB and 2,4-DB were each applied at ¾lb. and 1½lb. acid equivalent per acre when the peas were 6in. high. Ammonium DNBP at 1lb. phenol equivalent per acre was also applied. Details of the treatments and yields of the green unshelled peas are:—

| | Yield tons/acre | Days from sowing to harvest | Maturometer‡ test at harvest |
|---|---|---|---|
| Control (hand weeded) .. .. | 5.98 | 61 | 290 |
| Control (not weeded) .. .. | 5.72 | 61 | 293 |
| Ammonium DNBP 1lb./acre .. .. | 6.01 | 61 | 313 |
| Butyl ester of MCPB ¾lb./acre .. | 5.40* | 61 | 273 |
| Butyl ester of MCPB 1½lb./acre .. | 5.15† | 61 | 277 |
| Sodium salt of MCPB ¾lb./acre .. | 5.59 | 62 | 279 |
| Sodium salt of MCPB 1½lb./acre .. | 5.38* | 62 | 254 |
| Butyl ester of 2,4-DB ¾lb./acre .. | 4.60† | 62 | 196 |
| Butyl ester of 2,4-DB 1½lb./acre .. | 3.56† | 62 | 170 |

* Denotes significantly less than hand-weeded control at 5 per cent. level (Significant difference equals 0.56 tons)

† Denotes significantly less than hand-weeded control at 1 per cent. level (Significant difference equals 0.76 tons)

‡ A measure of the maturity of the crop.

After the peas had been sprayed with the hormones they had a wilted appearance. The effect of the MCPB wore off after a few weeks, but the plots treated with 2,4-DB were obvious by their distorted appearance right up to harvest. The hormones appeared to retard maturity and this was confirmed by the maturometer readings, which are a measure of the maturity of the crop. First-grade peas for canning or freezing have maturometer readings within the range 200 to 270. More mature peas have higher readings and heavier yields. If the control plots had been harvested at the same stage of maturity as the hormone-treated plots, probably very few of the latter would have had yields significantly less than the control plots.

In view of the promising results with MCPB in this trial and its toxicity to weeds reported in other trials further experiments are being conducted with these materials on peas in the current season.

## CARROTS

Pre-emergent applications of CMU and CIPC at 4lb. per acre both gave good weed control and increased yields of carrots compared with the untreated control. When each material was applied at 1lb. per acre the weed control was unsatisfactory and the yields were lower. TCA at 10lb. and 20lb. per acre, as a pre-emergent application, gave poor weed control and reduced the yield of carrots. The dry soil at the time of application and subsequently may have contributed to the poor weed control with TCA.

An application of 55 gallons per acre of kerosene when the carrots had 2 to 3 leaves gave good control for about 2 months, but subsequent weed growth smothered the plots.

*—F. B. THOMPSON*

*"A Classroom of 300 Acres"*

# The Special School for Boys at Otekaike

THE results that can be achieved from a farm plan based on the best advice available are clearly shown at the Special School for Boys at Otekaike in North Otago. The Special School is a training centre for boys of low intelligence from all parts of the country and is one of the many institutions administered by the Child Welfare Division of the Department of Education.

FIVE years ago the 300-acre farm at Otekaike was almost cropped out, and the Division called in the Department of Agriculture to prepare a soil survey and farm plan and advise what should be done to make the farm more productive. The results of the work that has gone into the property since then were shown last season—one of the driest on record—when production was higher than for many years as a result of limited irrigation, controlled grazing of improved pastures, and the use of silage, liquid manure, and compost.

The Special School property lies on the flat land and one ridge of a small valley facing the Waitaki River, not far from Kurow. It is dominated by the fine homestead built in 1878 by the Hon. Robert Campbell, who owned many thousands of acres in the Waitaki River basin and who died in 1889. The house was built of limestone quarried on the property and these deposits today provide the School with its supplies of agricultural lime.

The homestead and farm were bought by the Government in 1908, and the School, which was founded in that year, has since provided thousands of boys with the training in living and the manual skills they need to find their place in the community.

Some boys at Otekaike come from districts where there are no special classes for them to attend; others have been tried in special classes and found unsuitable, and there are some who have presented problems in behaviour at school. A small minority are wards of the State.

The course of action which takes a boy to Otekaike may start with the parents, or with his school, and all boys are examined by a psychologist or psychiatrist before the Superintendent of Child Welfare approves their enrolment.

The boys receive formal education to the limit of their abilities and remain at school to the age of 15. They then join the working group and are placed in various types of farm work, in the boot repairing shop, and in the carpentry shop to test their aptitudes.

## Recreations and Hobbies

The work and the recreations and hobbies the boys follow in their spare time give them a good, all-round background to living with other people and at the same time everything possible is done through the School's activities to throw responsibility on them and teach them to use initiative.

HEADING PHOTOGRAPH: Forking out silage on the farm of the Special School. When boys finish their schooling they join the working group and gain experience in farm work and other useful trades in preparation for earning their living.

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Otekaike is aptly described by the principal, Mr. D. P. O'Connor, as "a classroom of 300 acres". The garden and orchard, covering almost 10 acres, keep the School fully supplied with vegetables and provide most of the fruit needed by the community of 175 boys and staff. In a good season the hothouse produces a ton of tomatoes. The boys carry out all the tilling, planting, and pruning and learn to drive tractors and handle a wide range of farm and garden implements.

## Dairy Farming

The dairy herd comprises 30 grade Friesians, and the boys do all the milking in a shed built according to the best modern practice. Two bails are equipped for machine milking and two for training in hand milking. The washings from the shed and yard are carried in a concrete race to a tank and spread on the pastures.

Calves not needed for replacement of the herd are sold, and 30 to 40 dry cattle are run on 60 acres of hill country. In recent years aerial topdressing has greatly improved the carrying capacity of this hill land.

On an average the dairy supplies 150lb. of fresh milk daily to the School and 60lb. to the houses on the property, 150lb. of skimmed milk for School use, and 200lb. of cream a week for the local dairy factory.

## Pig and Sheep Raising

Pedigree pigs from Otekaike have won prizes at the Oamaru A. and P. Show in recent years. Breeding is from Large White boars and Tamworth sows and the practice of selling weaners has been abandoned in favour of fattening pigs on the property. The pigs are fed on fodder beet and kitchen offal.

Rugby practice for junior boys at the Special School. In the background is the administration building, formerly the homestead of the Hon. Robert Campbell.

The farm usually carries about 150 sheep. Every season, 120 to 130 store lambs are bought, fattened on lucerne, and sold. More lambs are bought close to the winter, carried over, shorn, fattened, and sold. Last season a profit of 30s. to 35s. a head was made on these purchases.

The small number of sheep carried does not justify a shearing shed, and sheep are shorn in the shed at the neighbouring Otekaike Station.

The main crop at the Special School is potatoes. Ten acres are planted and in a normal year the yield of 100 tons or so is sufficient to supply all the Child Welfare institutions in the South Island. Last season, however, as a result of drought, the farm produced barely enough potatoes for the needs of Otekaike.

In addition about 3 acres are planted in fodder beet and 3 acres in chou moellier. Silage is made and stored in bays cut in the hillside.

The garden and part of the orchard at the Special School. The garden and orchard cover 10 of the School's 300 acres and provide all the vegetables and nearly all the fruit required to feed 120 boys. In addition enough potatoes are usually grown to supply all the Child Welfare institutions in the South Island.

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Milking time at the Special School. There are 30 grade Friesians in the dairy herd and both machine and hand milking are taught.

## Forestry Training

Forestry is one of the most interesting aspects of farming at the Special School. When the property was privately owned large areas of the flat land in front of the homestead were covered with coniferous plantations. A sawmill produced 2,000,000 board feet of timber in 16 years, and several buildings at Otekaike, still in first-class order after 40 years, were constructed with *Pinus radiata* timber grown on the property.

Among the many splendid trees at the Special School are 27 varieties of conifers, but the valuable timber crops produced today come entirely from plantations of Douglas fir and *Pinus radiata* on land unfit for pastoral farming. The trees now being cropped are thinnings, which are sawn, barked, and creosoted by the boys for use as fence posts.

Stacking fence posts after creosoting. Thinnings cropped from the plantations on the farm provide all the School's fencing requirements and leave a surplus to be sold.

## Fencing Instruction

In the past 5 years the boundary fence—about 3½ miles long—has been completely renewed by the boys, who have also erected a similar length of fencing on the farm. In the past 2 years alone the plantations have supplied 800 fencing posts for use on the farm, and last year 100 strainers and 200 intermediate posts were sold.

In giving the boys experience in all departments of farm work the Special School has turned out some first-class hands at fencing.

Neighbouring farmers sometimes call on the School for help at week-ends. The boys are encouraged to go out and work for them; they enjoy doing it, and their earnings are paid into the School's recreation fund, from which all benefit.

Many, but not all, of the boys who leave Otekaike go to jobs on the land. When they have had sufficient training to enable them to take their place in the community the field staff of the Child Welfare Division help to find work for them. If a boy is best suited to farm work, the Child Welfare Officer will discuss his case with a farmer who is in need of a hand, and, if a job is arranged, visit the boy at intervals which gradually lengthen, until the Division is convinced that a good placement, satisfactory to all concerned, has been made.

# Ryegrass Staggers May be Prevalent in Autumn

By M. C. ARMSTRONG,
Veterinarian, Department of Agriculture, Timaru

**DURING autumn last year some districts in the South Island had a high incidence of ryegrass staggers in sheep flocks which caused anxiety for many farmers who had had little or no experience of this complaint previously. Ryegrass staggers is a temporary disturbance of the nervous system resulting in bouts of convulsive staggers when the affected animals are excited or disturbed.**

THE trouble occurs in most parts of New Zealand and can affect sheep, cattle, and horses of all ages, sexes, and breeds.

## Occurrence

The incidence varies from year to year according to seasonal conditions and is highest in years with a dry summer and autumn. Up to 75 per cent. of a sheep flock may be affected, but fortunately less than 1 per cent. dies, and most deaths are due to affected animals drowning in drains or creeks. Dairy cows are less often affected than sheep, beef cattle, or calves.

Ryegrass-dominant pastures are responsible and both perennial ryegrass and short-rotation ryegrass have caused outbreaks of staggers. Outbreaks are most commonly seen when the ryegrass pastures are dried up after a drought, when little or no green growth is present, or soon after rain, when growth is coming away again. Outbreaks are not uncommon, however, on longer, green pasture such as hay aftermath.

## Symptoms and Pathology

Symptoms vary widely in severity from slight stiffness of the limbs when animals are driven to complete inability of animals to stand or to make any sudden movement without falling. The commonest form is that in which the animals show no abnormality until they are driven or disturbed, when they show a characteristic stiff, bounding action for a few paces and then fall. Sheep usually run with a stiff-legged gait with both forelegs and hindlegs in unison and the head held high. Calves may run normally until the spasm occurs, when they usually have the legs bunched together under the body and leap from side to side before falling. The milder symptoms are not usually accompanied by loss of condition or deaths except from accident, such as drowning; even severe symptoms are rarely followed by death, and when they are it is probably from starvation.

On falling, the animals may struggle, show spasmodic convulsions, muscular tremors, and twitching and rolling of the eyeballs. Relaxation soon occurs, and after a few minutes, during which grazing may be attempted, the animals rise, and if not again disturbed, resume normal walking and grazing

Symptoms may appear a few days after stock enter the pasture on which the disease develops, and may disappear in from a few days to 2 or 3 weeks whether or not the stock are given a change of feed. Symptoms rarely persist for more than 2 or 3 weeks even if the stock are left in the same paddock as that in which the symptoms developed, especially if rainfall is sufficient to produce a good growth of pasture, thus altering the nature of the herbage being grazed.

No macroscopic or microscopic lesions have been found in numerous affected animals which have been examined. No abnormality of the blood content of calcium, magnesium, ketone bodies, phosphate, or sugars has been found in affected animals.

## Treatment and Prevention

No satisfactory treatment is known for ryegrass staggers and it is fortunate that normal, spontaneous recovery occurs whether the feed is changed or not.

Movement of the affected stock to alternate forage is the usual treatment recommended, but is often hard to arrange and in many cases apparently unnecessary. The dangerous stage in the pasture appears to be of fairly short duration in most cases, though it may last up to a fortnight in some. When sheep or beef cattle are being moved to alternate pasture care is necessary not to drive the stock too fast, and one of the best methods is to leave the gate open, keep men and dogs away, and let the stock find their way through in their own time.

## Cause

An unidentified agent in the pasture causing ryegrass staggers has been confirmed at the Department of Agriculture Wallaceville Animal Research Station by feeding experiments with grass cut from paddocks in which severe outbreaks of the disease have occurred.

Many theories have been advanced and tested regarding the causative agent of ryegrass staggers. Among these is the ergot theory. This may be disposed of by the fact that ryegrass ergot produces only ulceration of the tongue and stomachs in sheep and necrosis of the feet in cattle. Furthermore, many outbreaks of staggers have occurred in ergot-free ryegrass pastures. At present the most that can be said about the causative agent of ryegrass staggers is that it appears to be a product of a particular set of growth conditions in the plant, and future research into the pathogenesis of this disease is necessary to elucidate unknown factors.

## Management of Affected Flocks

As mentioned previously it is advisable to shift the flock quietly to a paddock with the minimum of drains or water holes to lessen the chance of drownings. Dipping or drenching may have to be postponed in badly affected flocks. Where the incidence is light the affected animals can be shedded off after a stir-up and drive. The unaffected ones can then be drenched or dipped and the affected ones isolated and treated in 2 or 3 weeks' time when they have recovered.

# "Pasture Production in New Zealand"

"NEW ZEALAND'S grassland covers about 31,000,000 acres and feeds about 38,000,000 sheep and 5,750,000 cattle. These in turn convert the produce of this grassland into about 225,000 tons of butterfat, 195,000 tons of wool, and 600,000 tons of meat each year."

This opening paragraph of the latest edition of "Pasture Production in New Zealand", Bulletin No. 250 of the Department of Agriculture, introduces a comprehensive and detailed discussion of the most important factor in New Zealand's economy, pasture production.

S. H. Saxby, Agrostologist, Department of Agriculture, the author of the bulletin, has divided it into sections on grasses, clovers and allied plants, and pasture management.

The conditions under which the various grasses and clovers are most useful are described and distinctions are made to aid recognition of grasses of similar appearance.

The section on pasture management is very comprehensive and describes types of pasture, influence of management, grazing on dairy farms, topdressing, establishment, harrowing and topping, and production of hay and silage. Other important subjects are drainage, irrigation, seed production and certification, and control of grassgrub and grass caterpillar.

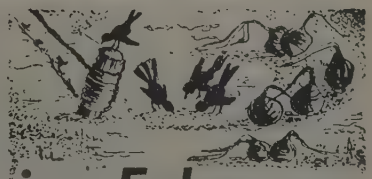
The bulletin's value is enhanced by a great number of illustrations.

The publication can be obtained from main offices of the Department of Agriculture for 2s. 6d. a copy.

# The Home Garden

By A. G. KENNELLY,
Horticultural Instructor, Department of Agriculture, Dunedin

**TO produce an abundance of vegetables in February usually is not difficult. Most hardy vegetables and many vegetables such as cucumbers, pumpkins, marrows, tomatoes, and beans that are half hardy or tender can readily be brought to maturity then, but abundant production of vegetables in February is not alone the mark of the efficient gardener. Continuity of supply within the limits set by the size of the garden, with special emphasis on having crops in bearing when vegetables are usually scarce and dear should be the aim, together with the maintenance of good soil texture, consistently heavy yields of quality produce, tidiness, and freedom from pests and disease. In this article work in the vegetable garden in February and some insect pests and their control in the garden are discussed. The section on pests will be concluded in next month's "Journal".**



## in February

THOUGH most gardens are well supplied with vegetables in February, there is still work to be done. The hoe should be used to keep down weeds. They are easily killed at this time of year, and though they can have little effect on the growth of crops that are mature or nearly so, if left, they soon scatter seed, from which plants grow and become a nuisance among succeeding crops.

Seed of salad crops such as lettuce, spring onions, radish, mustard, cress, and endive and other crops such as turnips, beetroot, spinach, silver beet, and spring cabbage and cauliflower can be sown. Small sowings of dwarf beans, peas, and carrots can be made in favourable situations in the warmer districts.

Kumara runners should be lifted to prevent their rooting and tall-growing tomato plants should be pruned and tied. Celery and celeriac should be kept well supplied with moisture. Celery can still be set out in favourable situations. Brassica crops should be sprayed or dusted to prevent attacks of pests, and in many districts tomato and potato crops will have to be sprayed or dusted as a precaution against pests and diseases.

Ground not required for some time for vegetables should be dug over and sown with a cover crop.

### Beetroot

In most districts February provides the final opportunity for sowing beetroot to mature before winter. There are several types of beetroot, flat or turnip-rooted, globe (round), intermediate, half-long (obelisk) or stump-rooted, and long. In most northern districts February sowings usually produce good crops if the situation is favourable and soil conditions are good, but in districts where autumn temperatures fall more quickly and frosts are earlier, seed should be sown in favourable situations not later than the beginning of February and a quick maturing, flat or turnip-rooted variety should be chosen.

Beetroot seed germinates in a wide range of soil temperatures, though if temperatures are low before plants are well developed, they may produce seed stalks instead of swelling the roots

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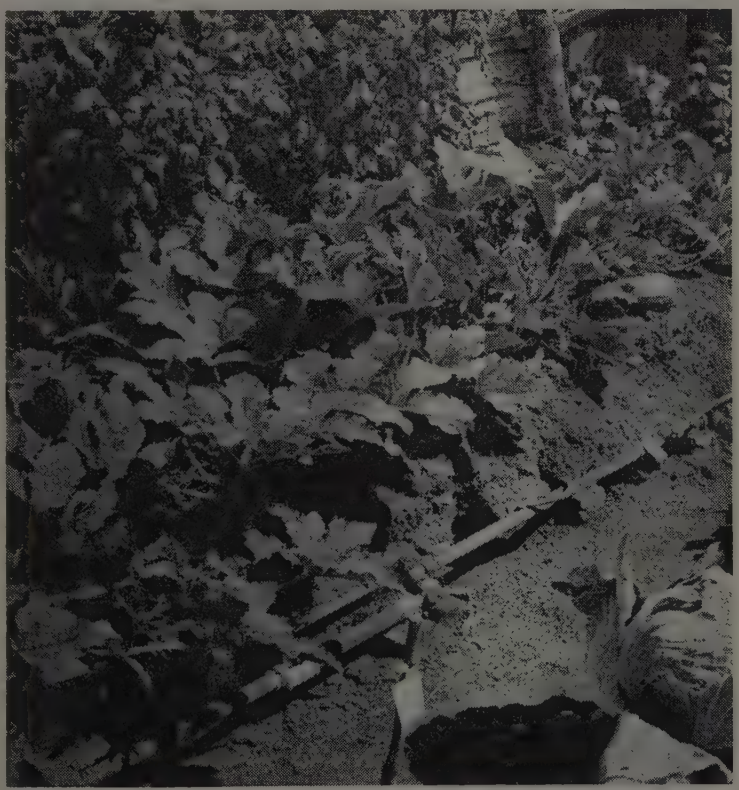
further. Good beetroot can be produced only by rapid growth, which in turn depends largely on soil fertility. In particular the nitrogen in the roots is in direct proportion to the amount supplied in the soil, and soils that produce the largest yields also produce plants that have the largest proportion of water to dry matter and so are most succulent.

Beetroot requires a sunny, open situation, as it rarely thrives if shaded, even if soil conditions are otherwise perfect. Soil and manurial requirements are similar to those for carrots. Seed should be sown ½in. deep, with about 10 to 15 seeds to the running foot in rows 12in. to 15in. apart. Plants should be thinned to 2in. to 3in. apart as soon as they can be handled.

## Silver Beet and Spinach Beet

Silver beet is also called Swiss chard or sea kale beet and good strains if well grown are particularly robust, with strong rooting systems and large succulent leaves. Spinach beet or perpetual spinach beet produces more numerous leaves that are not as large as those of silver beet but can usually be plucked from the plant over a longer period.

Onions are ready for harvesting in most districts in February. Harvesting was discussed in last month's "Journal".



Cucurbits such as marrow, pumpkin, and cucumber are useful for covering an untidy corner.

Silver beet and perpetual spinach beet are both excellent as stand-by crops, particularly in smaller home gardens, as in most conditions they bear for longer than any other greens. In addition, because of their vigour, they succeed in most soils and are not usually affected by root diseases.

Seed should be sown without delay in any but the most favourable districts to enable plants to make as much growth as possible before winter. Alternatively in the cooler districts plants should be set out. They are usually available from seedsmen. Seed should be sown ½in. deep in rows 15in. to 18in. apart. Most of the listed varieties are good.

## Spring Cabbage

Cabbage is one of the most valuable garden vegetables, as it is not only nutritious but grows well in a wide range of soils and in good conditions is one of the heaviest yielding crops.

Though in northern districts or in sheltered situations spring cabbage can be grown from seed sown in March, February is the preferred month for sowing. Where soil and situation are not good seed should be sown as soon after the end of January as possible. Seed of spring cabbage is not usually sown before the end of January, because if seedlings are set out too early, plants mature too quickly. If seed is sown early and plants are left in the seed-bed until the usual setting out time, they may become too large to transplant well. If very large plants are set out where winter temperatures are low, such plants are very liable to run to seed.

Though cabbage is a cool-climate vegetable, seed germinates and plants

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grow well in a fairly wide range of temperatures if the physical condition of the soil is good and it contains adequate moisture and plant nutrients.

**Protective Sprays**

Many home gardeners have difficulty in raising cabbage seedlings for setting out for the spring crop. The seed usually germinates quickly, but seedlings are often attacked by fungous diseases such as mildew and by insect pests such as aphids, caterpillars, or thrips. Regular spraying with bordeaux mixture or copper oxychloride will control most fungous diseases and if a suitable insecticide is applied, insect pests can be controlled also. Cabbage seedlings are difficult to spray, because the leaves have a smooth, almost greasy surface which is difficult to wet. In the early stages, too, the leaves are rather delicate and easily depressed by the pressure of sprays.

Proprietary wetting agents, which are usually compounds similar to detergents sold for household dish washing, aid the wetting of the leaves if added to the spray. If the spray is applied under pressure through a fine nozzle so that spray drifts as a mist, the under sides of most of the leaves should be covered with spray deposit.

Caterpillars and usually thrips are readily controlled by spraying with DDT. It can be used alone or added to the fungicidal spray. Thrips often check young plants and little is done about them because they are not seen unless the plant is examined closely. Thrips are minute, cigar-shaped creatures up to about ¼in. long. They are dark in the adult stage and have wings, with which they fly short distances if disturbed.

The immature stages are wingless, green or light yellow, and do not move readily. Thrips rasp the under surfaces of cabbage leaves and denude them of their green colouring matter and so reduce the leaf function.

Aphids, usually the cabbage aphid, which is greyish and rather mealy, may also attack cabbage plants. Among any group of grey aphids, particularly in dry conditions or toward the end of the season, a number are usually winged. Under dry conditions and in heavy infestations it is often possible, if the colony is observed closely, to see tiny wasps not much larger than the aphids which parasitise the aphids.

Aphids and to a great extent thrips can be controlled by spraying on a hot, still day with nicotine sulphate at 1 fl. oz. to 5 gallons of water (plus a little soap or lime to activate the nicotine). Alternatively HETP, which will also give good control of thrips, can be used at the same strength but without soap or lime.

**Varieties**

Flower of Spring, Enfield Market, and Triumph are among the best and most commonly grown varieties of spring cabbage, except in some northern parts of the North Island, where Jersey Wakefield and the summer cabbages Green Acre and Golden Acre are also favoured.

Several other good varieties are listed in most catalogues. For the home gardener who has sufficient ground and is interested in improving his crop a trial of a new variety is well worth while. It may specially suit his conditions and even if it is not an improvement, it may mature at a different period and contribute to the continuity of his supply.

[*Green and Hahn*

**Spinach beet or perpetual spinach is one of the most useful and long-standing crops in the vegetable garden. Seed can still be sown in most districts early in February.**

## Insect Pests of Vegetables and Their Control

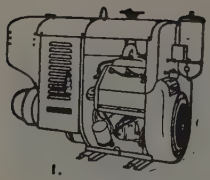
Whether the chief pleasure of a garden lies in the quality or abundance of its plants, in the harmony of its features, or in the appreciation a garden can confer of the harmony of nature, the true gardener is also interested in the many creatures to be found in it.

### Recognising Garden Friends

Most of the creatures which inhabit gardens are known to the gardener only indirectly. They are too small to be seen by the unaided eye, as they include such minute organisms as fungi, bacteria, viruses, protozoa, algae, and species of nematodes. Most live by the transformation or breaking down of organic matter, and from the gardener's point of view, are useful. A few kinds of fungi and bacteria and practically all the viruses are injurious to plants, and so, too, are those nematodes which invade plant tissue.

The larger creatures of the garden, such as slugs, snails, wireworms, caterpillars, and beetles, are better known, though comparatively few gardeners can correctly name more than a few; fewer can distinguish many of the garden friends from those regarded as foes. Even less is generally known by gardeners of control measures, though such knowledge is often the deciding factor between the success or failure of a crop.

It is important to be able to recognise garden friends. These include: Ladybirds and their dark, less handsome larvae; strong-jawed carnivorous ground beetles which are active and shiny black or brilliant greenish gold; rove beetles, sometimes known as the devil's coach-horses from their habit of cocking their ends in the air when disturbed; spiders, which so often inspire fear, yet are almost invariably shy and harmless to humans; dragon-



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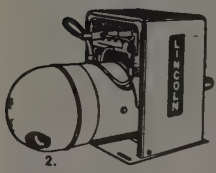

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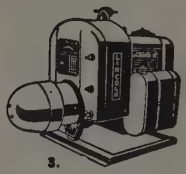

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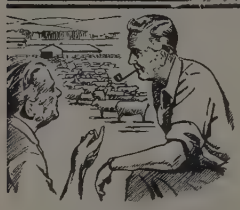

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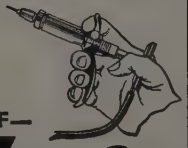

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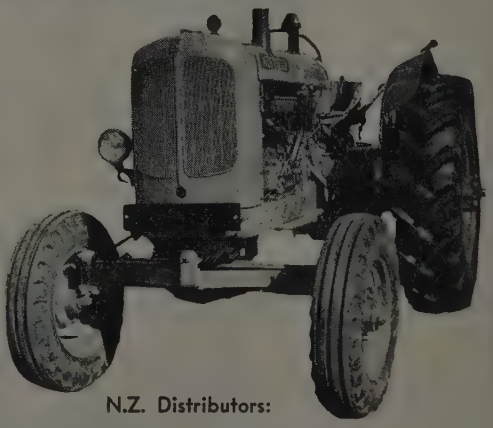

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flies; and in late summer, long-legged harvestmen, which are related to the spiders but are often confused by casual observers with the long-legged crane flies, which are not beneficial.

There are also lacewing flies, many kinds of beneficial wasps, and a host of other creatures, such as those commonly known as chalcid flies, ichneumon flies, scorpion flies, and hover flies. Some insects belong to the bee group and they or their larvae prey on garden pests. There are also predatory kinds of thrips, earwigs, and slugs, which attack their fellows or other plant eaters.

Some garden creatures have a less obvious value. They assist in pollinating flowers or are useful in hastening the decay of garden rubbish by the deposition of their eggs or their maggots or the spores of bacteria or fungi on it. The beneficial effect of earthworms in improving soil drainage and aeration, though sometimes overrated in the home garden, is well known.

The mantids, commonly called praying mantids from the way they stand and hold their saw-edged forelegs when waiting for their prey, are of doubtful value. They will as readily catch and eat garden friends such as bees, as destroy plant eaters.

Injury caused by insect pests is one of the reasons for some home gardeners' lack of success. It is important, therefore, to be able to recognise insect pests. That is the first step in control. Appropriate control measures can then be used before infestation becomes severe.

## Aspects of Pest Control

**Almost all the substances used to control insect pests in the garden are poisonous to humans. They should be labelled clearly and when not in use they should be corked or lidded and kept locked away securely.**

Quite small amounts of undiluted materials such as HETP, TEPP, malathion, lindane, and nicotine sulphate can have very serious results or even cause death if ingested or deposited on mucous tissue where they may be readily absorbed by the body.

The need in vegetable production to resort to the use of the formidable array of insect poisons now available has been said to be an indication of man's failure to work in harmony with nature. This is not true, as in most gardens only a few of the substances are needed and in many gardens throughout New Zealand no spraying is needed. Competent entomologists have claimed that over 95 per cent. of the hundreds of thousands of classified insects are beneficial or at least not harmful to man.

[*Green and Hahn*

Grey aphids (magnified) on cabbage.

Control of insect pests consists not only in the use of poisonous sprays, dusts, and baits, but in tidiness, in good husbandry, that is the growing of vigorous crops, the destruction of insect breeding places, and care in the introduction of new material to ensure that it is free from pests and their eggs.

When used at the recommended dilutions in the open air most insecticides are safe if ordinary commonsense precautions such as avoidance of inhalation or bodily contact with fumes or spray are practised. Some people are more sensitive than others to particular substances and if appreciable spray residues come in contact with the bare skin or fumes have been accidentally inhaled resulting in headache or giddiness, it is advisable to go inside and lie down, calling a doctor promptly if symptoms warrant it.

Generally a hot, still day gives the best kill with spraying or dusting. For nicotine sulphate particularly the temperature should be not less than 60 degrees F. An alkaline substance such as soap or lime, preferably hydrated lime, should be added to the nicotine.

Produce from plants that have been sprayed with poisonous substances which leave residues that persist for some time, such as DDT or arsenate of lead, should not be harvested until at least 3 weeks after the spray was applied. With nicotine sulphate an interval of at least a week is recommended. A day or two is enough where only TEPP or HETP has been used.

It is advisable to use only materials that have been certified by the Plant Diseases Division of the Department of Scientific and Industrial Research, as such materials have been submitted for test by the manufacturer or his agent and have proved satisfactory for the purpose for which they were certified. They should be applied at the recommended strength through good spray equipment.

The spray should preferably be driven under as much pressure as is practicable through a small aperture so that the object to be sprayed is enveloped in a wetting mist without excessive run-off and consequent waste of spray material.

Most of the insect pests likely to be found in the home vegetable garden are dealt with in alphabetical order in the following section. It will be concluded in the home garden notes in next month's issue.

## Aphids

Aphids are among the commonest pests of the vegetable garden. They are variously known according to their colour or characteristics as plant lice or green fly, black fly, grey aphid, root aphid, or woolly aphid. Almost all plants are liable to be attacked by one or more species, all of which are characterised by sucking mouth parts carried at the end of a rostrum or finger-like prolongation on the under surface of the head.

The rostrum is used to puncture the plant surface and, as the creature sucks the plant juices from beneath the surface of the plant, stomach poisons (such as arsenate of lead) sprayed on the surface are ineffective against it. Aphids may be winged or wingless and are usually about the size of a small pinhead. They cause curling and distortion of the leaves, stunting, and wilting in hot weather when they are numerous. They also spread disease.

The black aphids which commonly attack beans can often be controlled

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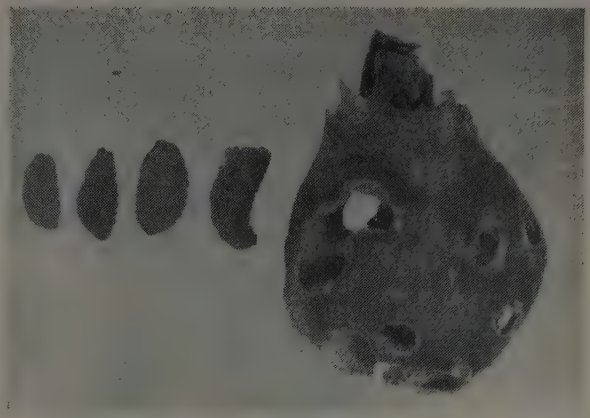
## Forestry is forever

*Inserted in the interests of forest protection by the New Zealand Forest Service . . . Soil Conservation Council.*



Larvae of the bulb fly and a damaged bulb.

Carrots infested by rust fly. Maggots are protruding from the middle root.

on broad beans by their natural enemies if the soft tops are pinched out of the plants before the infestation becomes widespread. The grey aphid which commonly infests members of the cabbage family such as brussels sprouts, turnips, and cabbages can usually be controlled more readily if a small amount of wetter or detergent is added to the spray. The green carrot aphid should be looked for and if necessary spray applied early if damage to young carrots is to be avoided. One of the first signs observed by most gardeners is the presence of the cast-off skins of the aphids, which are rather like flakes of cigarette ash.

**Control**

Aphids can be controlled by spraying with nicotine sulphate at 1 fl. oz. to 5 gallons of water plus 1oz. to 2oz. of soft soap, preferably on a hot, still day. Alternative sprays and ones that do not depend on a warm atmosphere to be effective are HETP (containing not less than 15 per cent. of TEPP) at 4 teaspoons to 4 gallons of water, or TEPP (containing not less than 38 per cent. of TEPP) at 2 teaspoons to 4 gallons of water.

**(See also root aphids.)**

## Army Worms

**(See cutworms.)**

## Bean Weevil

Bean weevils are about ¼in. long and robust. The wing covers are shorter than the abdomen and the head is carried largely beneath and at right angles to the body. The adult weevil varies in colour from grey to brown with a velvety greenish tinge. The grubs are small, a number of them being able to occupy a single small white bean.

The emerging bean weevil chews small holes in stored bean seed, but original infestation begins on the plants where the adult weevils lay eggs in the pods. Badly infested seed will not germinate.

**Control**

Weevils can be controlled in stored bean seed by mixing 1oz. of copper carbonate powder with each 6lb. of seed or by mixing DDT with the seed.

## Beetles

Most beetles harmful to plants are comparatively slow moving and should not be confused with such active and beneficial creatures as rove beetles, which look somewhat like small earwigs but without the pincers on the tail, or carnivorous ground beetles, which may be shiny black or brilliant greenish gold and which have strong pincer-like mouth parts.

**(See also *wireworms, bean weevils, *vegetable weevil, and grass-grub.)**

## Black Aphids

**(See aphids.)**

## Black Fly

**(See aphids, *thrips.)**

## Bulb Fly

Onions or members of the onion family are sometimes attacked by the larvae of one or other of two species of bulb flies. Eggs are usually laid on the exposed necks of the bulbs and the grubs enter the bulbs and destroy them. Spraying or dusting either with lindane or dieldrin usually gives protection.

## Cabbage Caterpillars or Worms

**(See caterpillars.)**

* In home garden article in next month's issue.

## Carrot Rust Fly and Maggot

The adult carrot rust fly is a small, shiny black fly about 1/3in. long with reddish eyes in a yellowish head. It has yellow legs and one pair of wings. It lays its eggs near the crown of the carrot and when the larvae or maggots hatch they burrow down and attack near the tip of the taproot. Young plants may wilt and die.

The maggots burrow into the tissue of the taproot and leave rusty brown tunnels, at first only near the surface. Maggots are slender, creamy white, rather rigid, legless, up to ½in. long, and broad at one end and tapering to a slender head.

**Control**

Dieldrin or lindane seed dressings usually give protection for up to 2 or 3 months. If these materials are not used, the crop can be treated with lindane or dieldrin when the plants are showing the first true leaves. Dusts can be used, but a soil drench is most effective.

The protection of long-standing crops can be ensured by spraying foliage with dieldrin (0.1 per cent.) or DDT at intervals of about 2 to 3 weeks. Carrot rust fly is unlikely to be troublesome south of Palmerston North.

## Caterpillars

There are many kinds of caterpillars in gardens, three of the most destructive being the looper caterpillar, the tomato caterpillar, and the cabbage caterpillar, which is the larva of the well-known white butterfly.

**Looper caterpillars** are green, and about 1½in. long when fully grown. They can usually be distinguished by

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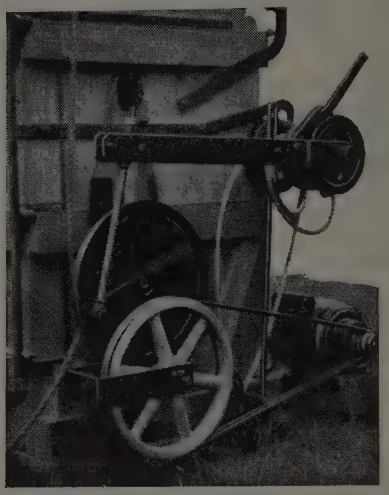

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[*Green and Hahn*
**Looper caterpillars.**

their habit of progressing with a looping motion. When disturbed, they frequently remain attached to the plant by the hind end of the body and wave the remainder about in wide sweeps. The brown pupae are enclosed in webbings of white silken threads and can be found on the under sides of leaves or some sheltered place above ground. The insects overwinter in the pupal stage above ground in sheltered places.

**Tomato caterpillars** vary in colour from light green, pinkish, or brown to almost black and are marked with alternate light and dark longitudinal lines. They are about 1½in. long when fully grown. Pupation occurs in specially constructed cells in the ground, in which conditions the insects overwinter, though there are probably several generations a year.

**The cabbage caterpillar** in the young stages is sometimes difficult to distinguish from the caterpillar of the diamond-backed moth. However, the latter is characterised by its wriggling motion when disturbed and will frequently drop from the leaf suspended by a silken thread.

**Control**

Control measures for caterpillars include the use of DDT sprays and dusts, DDD sprays, or lindane sprays or dusts. Derris dust is useful if plants have to be treated within 3 weeks of harvest.

**(See also *potato tuber moth, *stem borer caterpillars, *subterranean grass caterpillars, and cutworms.)**

## Centipedes

Practically all centipedes are carnivorous and beneficial, as the commoner kinds feed mainly on small slugs, worms, and other insects. There are a number of centipede-like creatures such as symphylids which damage the roots of plants. For control of centipede-like creatures see the section on millepedes.

## Click Beetles

**(See *wireworm.)**

## Cockchafer Beetles

**(See *grass-grub.)**

## Clover Mites

**(See *mites.)**

## Collembolas

Collembolas or springtails are primitive, wingless insects and though a few species do not have appendages and are incapable of springing, they get their popular name because the common species have a pair of appendages at the ends of their abdomens which enable them to spring into the air. There are two principal kinds in the vegetable garden.

The first are small, rather globular, and black, brown, or yellow, the largest common species being about the size of a pinhead and superficially resembling an aphid. They eat small irregular holes in leaves of plants and jump strongly if disturbed. The second kind are bluish, grey, or white insects, rather like tiny pieces of thread or cotton. Though some in this group attack cultivated mushrooms and seedlings, most species are harmless and usually occur in vast numbers only on compost or damp soils rich in organic matter. Usually they are attracted to rotten vegetation, such as damaged stems or roots, or seeds that have failed to germinate. They are occasionally blamed for damaging young plants and may be capable of it, but usually plants apparently attacked by them are unthrifty because of environmental conditions such as poor drainage, excess damp, or insufficient aeration.

**Tomato caterpillars or corn ear worms on maize.**

* In home garden article in next month's issue.

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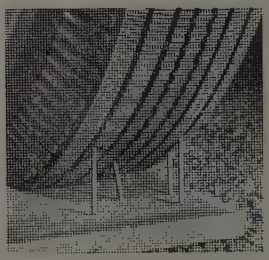

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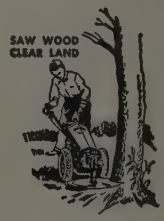


**Control**

All species of springtails can be controlled by DDT or BHC, though sprays of HETP or nicotine sulphate (plus soap), 1 fl. oz. to 5 gallons of water, are usually employed against those in organic matter.

## Crane Flies

The larvae or grubs of the long-legged, awkward-looking crane flies, known commonly as daddy-long-legs, are sometimes destructive to long-standing crops in the garden. There are several species of crane flies and the grubs, which are commonly called leather-jackets because of their tough skin, are up to about ¾in. long. They vary in colour from grey to dark grey or brownish. They have biting mouth parts and are without legs.

The daddy-long-legs should not be confused with the long-legged, wingless harvestmen, which are beneficial and superficially somewhat like spiders.

**Control**

Crane fly larvae can be controlled by the means recommended for grass-grubs.

Crane flies, known commonly as the daddy-long-legs; male (left) and female (right).

## Crickets, Grasshoppers, Wetas

Several species of crickets are sometimes harmful to plants, and ground wetas and grasshoppers are sometimes found in the garden, the wetas particularly during digging.

Ground wetas live mainly on organic matter and are not harmful to plants.

**Control**

All these creatures can usually be controlled by the use of DDT, lindane, or dieldrin sprays or dusts.

## Cutworms and Army Worms

Cutworms are smooth bodied, somewhat variable in colour, and sluggish. They are caterpillars of different night-flying moths and are usually from about ¾in. to 1½in. long. They get their name from their habit of cutting off young plants at the bases by eating through the stems, though they may also eat into lettuces and root crops such as beetroot. They usually shelter in the soil at the bases of plants during the day and emerge at night to feed.

Army worms are somewhat similar to cutworms and get their name from their habit of advancing in hordes, usually in one direction, stripping crops as they go.

**Control**

Cutworms and army worms can be controlled by spraying or dusting plants or ground round them with DDT or by putting down poison baits. These can be made up of 1½lb. of bran and 1oz. of paris green (or 1oz. to 2oz. of arsenate of lead), ½lb. of molasses or treacle, and about a pint of water. This amount is enough to cover about 200 sq. yds. The bait should be used in a day or two, because it becomes mouldy if stored.

Typical damage caused to a cabbage by diamond-backed moth caterpillars.

## Daddy-long-legs

(See crane fly.)

## Diamond-backed Moth Caterpillars

(See caterpillars.)

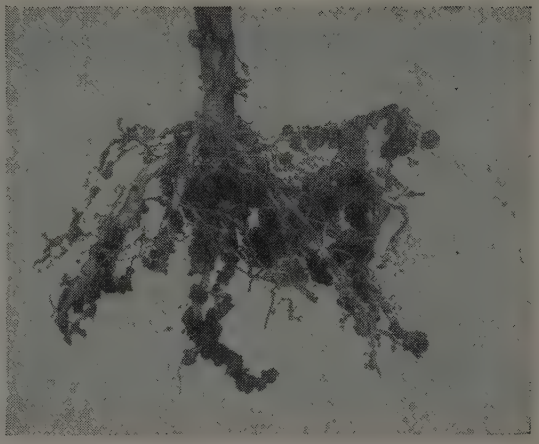
## Earwigs

Earwigs can be recognised by the forceps at the tail ends of their bodies. Some kinds lack wings, but the European earwig, which is the species responsible for most damage, has a pair of large, elaborately folded wings hidden beneath a pair of short, hardened forewings. It rarely flies, however. The European earwig has been established in parts of New Zealand for many years and occasionally attacks vegetables, seedlings, and

other tender growth, flowers, and fruit.

**Control**

Earwigs shelter in daytime under stones, sacking, wood, or rubbish and thus can be trapped by laying folded or crumpled paper, short lengths of hollow stem—broad bean is useful—or similar material, which can be shaken every day or two over a bucket of water containing a little kerosene or disinfectant. Alternatively DDT sprayed or dusted on infested areas is effective.



[*Department of Scientific and Industrial Research*

Tomato root infested by eelworm.

**Eelworms**

Gardeners frequently confuse eelworms (nematodes) with wireworms, though apart from their worm-like shape and habit of injuring plants the two have little in common. Eelworms are of two kinds, the Gordian worms (commonly known as threadworms), which are the long, hair-like creatures that sometimes appear in gardens after heavy rains, and the eelworms that attack plants and are mainly microscopic, the largest being only about 1/20in. long when fully grown.

Some of the commonest kinds of eelworms cause small, knobby growths on fibrous roots, not unlike the nodules on the roots of legumes and pimply outgrowths on tubers, and swollen, thickened stems on bulbous plants. Affected plants tend to wilt in dry conditions and usually have an unthrifty appearance.

**Control**

Control is difficult and usually consists of fallowing the land for several years or growing only non-susceptible crops. Under glass, control usually consists of steaming the soil or treating it with chemicals such as chloropicrin or DD. These methods are not usually considered practicable outdoors because of the cost.

# Agricultural and Pastoral Show Dates

THE following are dates and venues of A. and P. shows from mid-January to the end of April.

## NORTH ISLAND

**January**

18 and 19 January—Feilding I., A., and P. at Feilding.

*19 January—Kaeo A. and P. at Kaeo.

19 January—Central Hawke's Bay A. and P. at Waipukurau.

22 and 23 January—Rotorua A. and P. at Rotorua.

*25 and 26 January—Horowhenua A. and P. at Levin.

26 January—North Kaipara A. and P. at Paparoa.

30 January—Marton A. and P. at Marton.

**February**

1 and 2 February—Rodney A. and P. at Warkworth.

2 February—Woodville A. and P. at Woodville.

*2 February—Rangitikei A. and P. at Taihape.

*5 and 6 February—Dannevirke District A. and P. at Dannevirke.

7 February—Te Kauwhata A. and P. at Te Kauwhata.

8 February—Dannevirke District Annual Ram Fair at Dannevirke.

8 and 9 February—Taumarunui and District A. and P. at Taumarunui.

8 and 9 February—Taranaki A. and P. at New Plymouth.

9 February—Pahiatua A. and P. at Pahiatua.

9 February—Hukerenui A. and P. at Hukerenui.

9 February—Waitemata A. and P. at Waiwera.

13 February—Te Awamutu A., P., and H. at Te Awamutu.

15 and 16 February—Ohura A., P., H., and I. at Nihoniho.

*15 and 16 February—Masterton A. and P. at Masterton.

16 February—Tauranga A. and P. at Tauranga.

16 February—Northern Wairoa A. and P. at Arapohue.

16 February—Waiapu P. and I. at Ruatoria.

16 and 17 February—Franklin A. and P. at Pukekohe.

19 February—Otorohanga A. and P. at Otorohanga.

21 February—Matamata A. and P. at Matamata.

22 and 23 February—Te Kuiti and District A. and P. at Te Kuiti.

22 and 23 February—Wellington and Hutt Valley A. and P. at Trentham.

23 February—Putaruru District A. and P. at Putaruru.

*23 February—Te Puke A. and P. at Te Puke (50th Jubilee).

**March**

2 March—Albany A. and P. at Albany.

2 March—Mangonui County A. and P. at Kaitaia.

2 March—Waikato Central A. and P. at Cambridge.

2 March—Waiotira Junction A. and P. at Waiotira.

2 March—Whakatane A. and P. at Whakatane.

6 March—Morrinsville A. and P. at Morrinsville.

*9 March—Opotiki A. and P. at Opotiki.

9 March—Kumeu District A. and P. at Kumeu.

15 March—Wellsford A. and P. at Wellsford.

16 March—Hawke's Bay A. and P. at Hastings.

## SOUTH ISLAND

**January**

19 January—Peninsula H. and P. at Duvauchelle.

26 January—Golden Bay A. and P. at Takaka.

26 January—Palmerston and Waihemo A. and P. at Palmerston.

*26 January—Waiau A. and P. at Tuatapere.

30 and 31 January—Otago A. and P. at Dunedin.

**February**

2 February—Banks Peninsula A. and P. at Little River.

9 February—Inangahua A. and P. at Reefton.

16 February—Murchison A. and P. at Murchison.

*22 and 23 February—Buller A. and P. at Westport.

23 February—Maniototo A. and P. at Ranfurly.

23 February—Kaikoura A. and P. at Kaikoura.

**March**

2 March—Temuka and Geraldine A. and P. at Winchester.

9 March—Cheviot A. and P. at Cheviot.

9 March—Mt. Benger A. and P. at Roxburgh.

16 March—Upper Clutha A. and P. at Wanaka.

16 March—Hawarden A. and P. at Hawarden.

*16 March—Mayfield A. and P. at Mayfield.

30 March—Methven A. and P. at Methven.

**April**

6 April—Oxford A. and P. at Oxford.

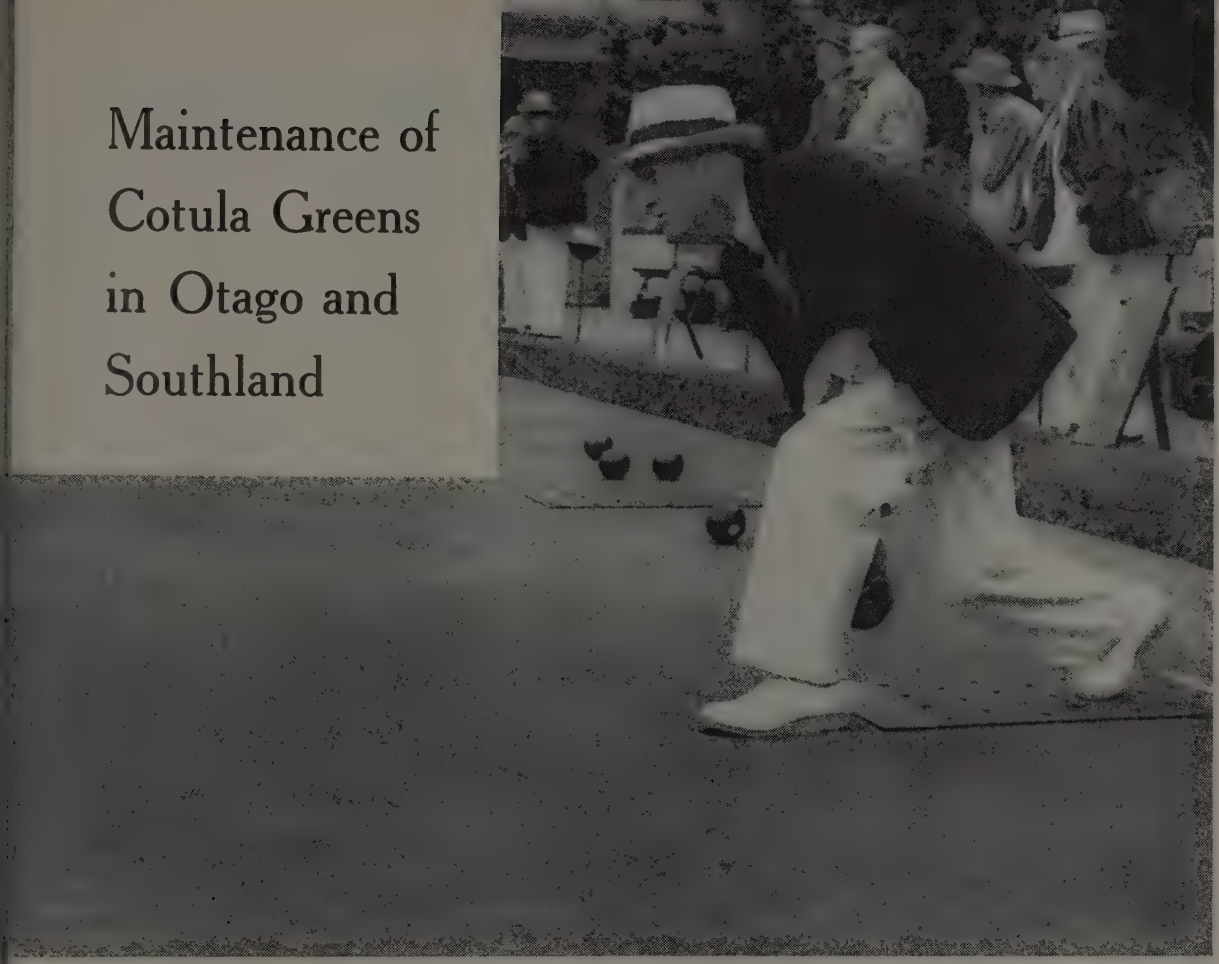
13 April—Malvern A. and P. at Sheffield.

22 April—Strath Taieri A. and P. at Middlemarch.

*22 April—Mackenzie Highland Show at Fairlie.

* The Department of Agriculture exhibit will be staged at this show.

# Maintenance of Cotula Greens in Otago and Southland



By S. M. J. STOCKDILL,
Fields Instructor, Department of Agriculture, Dunedin

**IN recent years so-called "weed" greens have become popular with bowlers, many of whom demand a weed surface in preference to a pure browntop and chewings fescue association. Of the so-called "weeds" *Cotula pulchella*, which is found naturally in coastal areas of Southland and is commonly known as Pahia weed, provides the most hard-wearing and uniformly fast playing surface.**

*COTULA DIOICA*, which is of more widespread natural distribution, is not as hard wearing and consequently is less desirable. Starweeds (*Plantago triandra* and *P. hamiltoni*) which occur naturally in association with the cotulas have also been introduced to most weed greens and though they are inclined to detract from the appearance of the green, they are hard wearing and provide a surface of similar speed and trueness to that of cotula.

In some of the high-rainfall areas waxweeds (*Hydrocotyle* spp.) are employed, but these and other weeds, such as *Pratia angulata* and *Selliera radicans*, offer variable resistance to the bowl and are undesirable when they occur as patches in predominantly cotula or starweed greens.

The maintenance of a stable cover of cotula or starweeds, or a combination of both, is more difficult than the maintenance of a browntop and chewings fescue association.

Many undesirable plants, such as *S. radicans* and *P. angulata*, occur naturally in association with the desirable species, and great care must be taken to avoid their introduction to the green, where eradication without damaging the cotula and starweeds is impossible.

In addition both cotula and starweeds are more or less winter dormant and moss, algae, and *Poa annua* can be troublesome during this period of dormancy. Consequently the aim is generally to produce an association which will be cotula dominant (with or without starweeds) during the playing season, but which will contain sufficient fine grass to compete with the *Poa annua*, moss, and algae in winter.

## Fertilisers and Soil Acidity

By using the non-acidifying fertilisers blood and bone, nitrate of soda, or a fertiliser of the ammonium nitrate plus calcium carbonate type a lush, soft growth of cotula can be produced, but *Poa annua* and worm activity will be encouraged and the green will not withstand the hard wear required of it.

To produce a hard-wearing turf acidifying fertilisers must be used and a mixture of 3 parts of sulphate of

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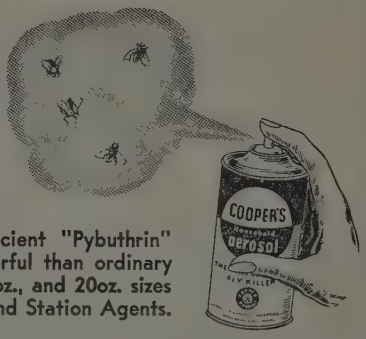


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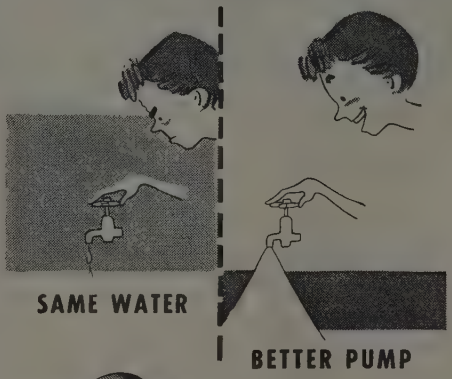


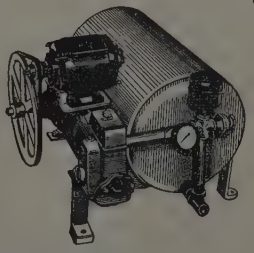

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P.16

ammonia and 1 part of superphosphate has proved satisfactory. Applied at 1oz. per square yard in the morning when the dew is on the green and when a fine day is likely to follow, this mixture gives a contact burn which helps to control moss, clovers, and other undesirable weeds without much damage to the cotula. Great care must be taken to obtain an even spread of fertiliser, half of which should be applied in one direction and the other half crosswise.

The fertiliser should be fanned up in the air to ensure that it does not fall unevenly and cause excessive burning. The fertiliser should be applied at close of play in autumn, in spring as soon as there is evidence of growth, usually early in August, and again early in September about a month before opening for play.

Continued use of the 3 to 1 mixture in this way will acidify the soil and an acidity of pH 5.0 should be aimed at on most soils. This level of acidity will tend to discourage the growth of *Poa annua* and clovers and inhibit the activity of worms and soil organisms, while promoting a healthy growth of cotula and fine grass and the build-up of a hard-wearing turf.

Care must be taken not to carry the acidification process too far, or it will result in the formation of hard patches, typified by unthrifty growth and lack of water penetration. When this stage is reached and over-acidity is confirmed by a soil test of below pH 5.0 advice should be sought on the use of lime as a corrective.

## Topdressing Soils

One factor in green maintenance which calls for more attention than normally is given is the selection of suitable soils for topdressing. The practice of accepting any soil which is readily available cannot be condemned too roundly. Highly fertile soils are usually very weedy and should be avoided, as also should any soil containing stones or sandy material. Soils taken from roadsides should always be suspect.

A suitable soil is one which will remain stable and not erode should bare patches occur and for this reason it should have at least a moderately high clay content. It should also be sufficiently acid to avoid any marked alteration in the acidity of the green. The ideal would be a clay soil from an area carrying a natural cover of browntop which should be fairly acid and free from clover, *Poa annua*, and other undesirable weeds.

The soil should be on hand some months before it is required so that it may be turned over several times and screened ready for use. Soil for autumn topdressing need not be screened as finely as that for use in spring and on areas which are to be built up coarser material should be used, as it is less likely to smother the existing turf.

## Weed Nursery and Use of Plugs

It has been emphasised that many extraneous weeds occur naturally with cotula and in obtaining plugs for renovation purposes from natural sources these undesirable plants are likely to be introduced. In addition natural plugs are often of a spongy texture, making them difficult to insert into the green successfully.

To overcome these difficulties a well-kept weed nursery is necessary. This can be cut and rolled in the same way as the green and, with a great deal of tedious work, kept free from weeds, thus providing a handy source of weed-free plugs of a consistency approaching that of the green itself.

Plugs inserted into bare patches on the green should be placed slightly below the level of the green and covered with fine soil; otherwise they may spring up and be scalped by the mower. They should also be placed as closely together as possible, because the spread of cotula from them is usually quite slow.

## Autumn Renovation

Before close of play all undesirable species such as clovers and pearlwort should be removed either by spotting out with weedkiller or by removing and replacing with cotula plugs.

Fertiliser as outlined previously should be applied. Bare patches can also be attended to by inserting cotula plugs or by grooving with a rake and sowing browntop and chewings fescue.

Renovation must begin as soon as play ceases, when the green should be thoroughly sliced or grooved. Various machines are used for this work, but the aim of slicing is to rejuvenate the cotula by cutting the stolons and promoting fresh growth. Grooving either with a rotary or tine machine will also cut the cotula stolons, but in addition will leave a series of grooves about 1in. apart which will provide an ideal seed-bed for the introduction of chaffed cotula plants and grass seed. The grooves also ensure that the topdressing soil is incorporated into the green rather than being spread as a layer on the surface.

The grass seed mixture should consist of 1 part of certified browntop to 2 parts of chewings fescue and the rate of seeding will vary from 1oz. per square yard on bare areas to almost nil where there is a good cover. Care must be taken to obtain seed of high purity and germination. Browntop seed containing seed of *Juncus bufonius* (toadrush) should be avoided, as this weed can be troublesome on greens; and, as the germination of chewings fescue seed deteriorates fairly rapidly, new season's seed should be used. The use of 1oz. of a mercuric seed dust to each 20lb. of seed mixture may guard against seedling fungous attack.

Obvious bare patches which were not plugged with cotula earlier should be plugged at this stage if weed-free plugs are available. An alternative method with some merit is the introduction of lengths of cotula stolons to the grooves on the bare patches.

The topdressing soil should then be spread evenly over the area with the aid of straight edges. If the green is not reasonably level, it should be surveyed so that lower areas may be built up. However, not more than ½in. of soil can be applied safely at any one time; and, if a greater build up is required, a series of ¼in. applications should be made to allow the growth to come through after each successive application.

## Winter and Spring Treatment

Throughout winter the green must be mown periodically to avoid excessive growth and should be gradually reduced to about playing height in August, when, after the application of fertiliser, a very light application of fine soil should be made to even out any minor irregularities. This should be followed in September by another application of fertiliser and the green then kept at playing height in readiness for opening in October.

The mower should be set to cut at a height equivalent to about the thickness of a 2s. piece until the end of November, when it can be lowered to remove the button-like seed heads of the cotula and to provide the fast, true surface demanded by bowlers. It must, however, be remembered that by keeping the mower up in the early part of the season a better green can be expected during the latter part when competition play is in full swing.

Heading photograph by E. A. Phillips.

# C.R.D. to be Name of New Ryecorn

From the 1956-57 harvest all New Zealand certified ryecorn seed will be known as C.R.D. This is the name given to an improved N.I.A.B. ryecorn which is being multiplied in New Zealand under certification. Information about this new selection, which has been developed by the Crop Research Division of the Department of Scientific and Industrial Research, was given in an article in the May 1956 issue of "The New Zealand Journal of Agriculture".

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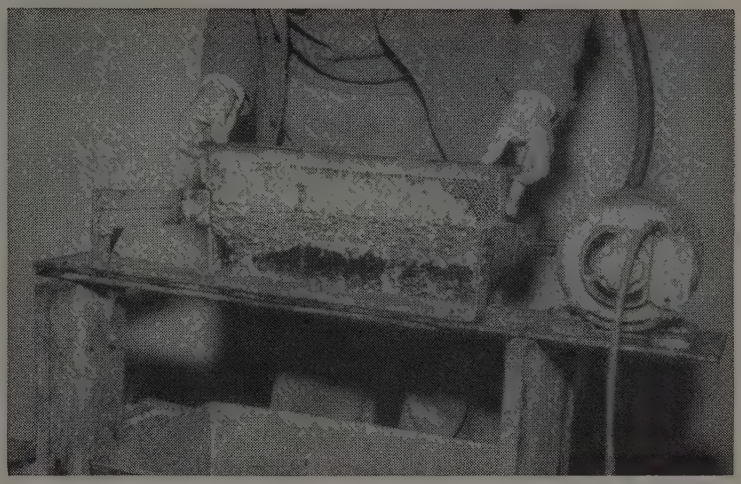
# An Improved Mechanical Uncapper for Honeycombs

By D. A. BRISCOE,
Apiary Instructor, Department of Agriculture, Tauranga

THE uncapping of combs of honey has in the past been considered laborious and tedious work, but various appliances in use today enable the beekeeper to do it with more efficiency and less effort. As between 300 and 400 full-depth combs have to be uncapped on two sides for every ton of honey extracted, the magnitude of such an undertaking during the honey flow can well be imagined. To speed up this work and reduce the effort needed, Mr. G. Corlett, Tauranga, has constructed a steam-heated vibrating blade.

THE combs of honey are uncapped longways from bottom bar to top bar. With the very rapid vibrations (about 1400 a minute) and only a slight blade movement (3/16in.) no effort by the user is needed. The length of the cutting blade and the distance of travel (3/16in.) are slightly less than the inside measurement of a standard frame.



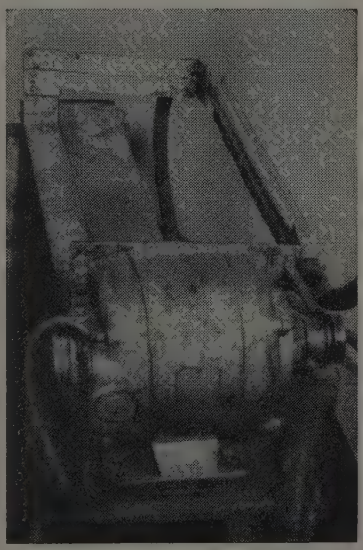
The uncapping blade in action.

## Parts of Equipment

The appliance is efficient in operation and is simple in construction.

### Cutting Blade

The cutting blade, 16 11/16in. long, is made from a piece of stainless steel 1/16in. thick by 2in. deep. One edge is ground to a sharp cutting edge, and a steam jacket is soldered to the back side (the opposite side to that ground) for its complete length and about ¼in. below the cutting edge.



End view of the uncapping machine.

### Steam Jacket

The steam jacket is made from an ordinary piece of ⅜in. soft-copper water tubing, flattened to allow about ⅛in. space inside for the passage of the steam. Two 3in. pieces of ½in. copper tubing are cut and soldered, one to each end, to the jacket, to serve as steam inlet and outlet and also for mounting the cutting blade.

The jacket is then soldered in place on the cutting blade in the position already mentioned.

### Base for Motor and Blade

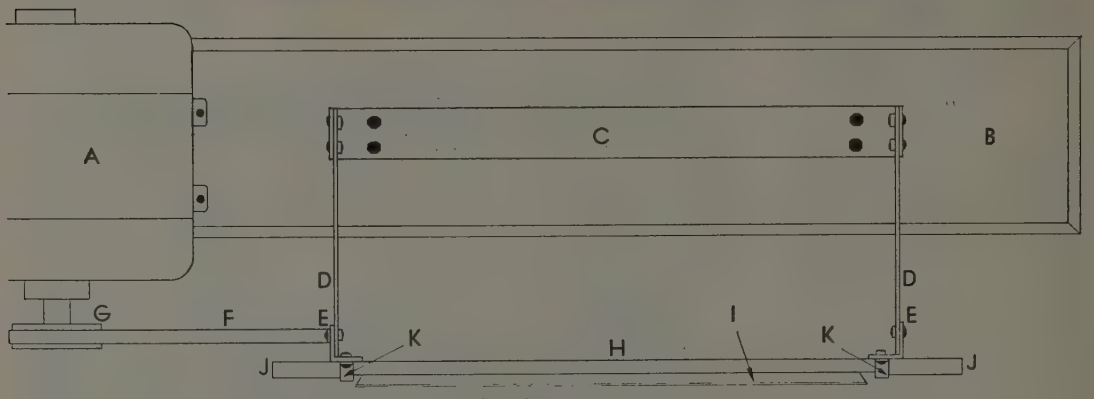
The base on which to mount the motor and cutting mechanism is made from a piece of 6in. x 4in. dressed timber about 3ft. long.

### Blade Holder

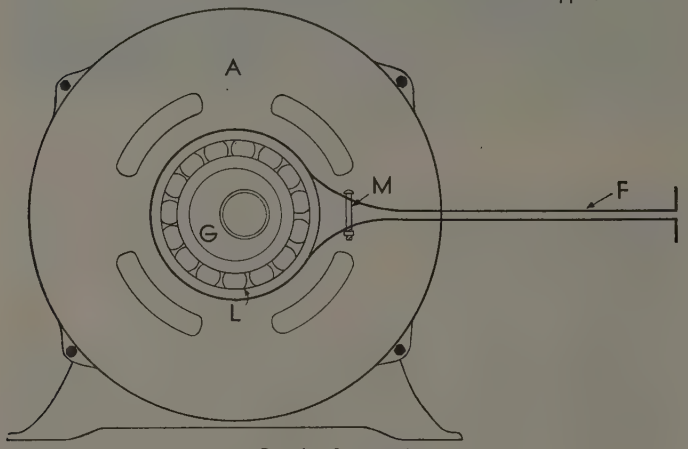
A piece of ⅛in. mild steel 1½in. wide and about 24in. long is required. About 4in. in from each end this is bent to right angles with the base. This is to hold the complete unit, and the length of the ends that are bent "up" is governed by the type of motor being used. On most ¼ h.p. motors the centre of the driving shaft is about 3⅜in. from the base. When this piece of steel is being cut and bent it is important to keep this point in mind.

The ¼ h.p. motor and eccentric in position.

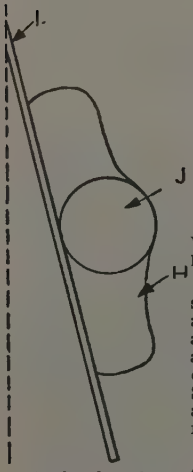
# AN IMPROVED MECHANICAL UNCAPPER FOR HONEYCOMBS




Plan of uncapper.




Details of eccentric.




Angle of cutting blade from vertical.

Key to diagrams. A—¼ h.p. motor. B—Timber base 6in. x 4in. x 3ft. (dressed). C—Mild steel 1½in. x ⅛in., about 24in. long. D—Two pieces of spring steel 8in. x 2in. x 1/32in. thick. E—Two angle brackets each about 2in. long. F—Spring steel strap ⅜in. x 1/16in. (length to suit). G—Eccentric. H—Steam jacket. I—Cutting blade. J—Steam inlet and outlet (two 3in. pieces of ¼in. copper pipe). K—U brackets for holding blade. L—Sealed ballrace with ⅞in. centre. M—Nut and bolt for strap attachment.

This piece of steel is drilled first for mounting on the wooden base and then on each bent-up end, to which the pieces D are attached (see upper diagram on this page).

An old hand saw is ideal for the two pieces of spring steel 8in. long by 2in. wide and about 1/32in. thick. The angle brackets (E in the diagram) should be drilled and attached as illustrated; the opposite ends (of the pieces D) are drilled to coincide with the holes drilled in the bent-up ends of the steel base C and then also bolted in position. Split spring-steel washers should be used and it would be a good idea also to use a lock nut. This machine vibrates rapidly and all joints should be as secure as possible.

## Assembling Equipment

The cutting blade is now fixed in position by the two U brackets (K in the diagram), and it should be noted that the blade is off vertical by about ⅛in. This reduces drag when combs are being uncapped, as only the sharpened edge of the blade is actually in contact with the honey.

The U brackets should be attached as close as possible to the cutting blade on either end to prevent movement (see diagram).

## Details of the Eccentric

The eccentric should be kept as light as possible. If the materials used are too heavy, serious strain will be placed on the motor bearings and there will be loss of motor speed and unnecessary general vibration.

The eccentric itself should be kept as small as possible and fit a readily available sealed ballrace with a ⅞in. centre and with as small an outside diameter as possible. The eccentric should be 2/1000in. oversize and drilled 3/32in. off centre to give a blade movement of 3/16in., and it should also be drilled to be a tight fit on the shaft of the ¼ h.p. motor.

The eccentric is pressed into the ballrace and the unit pressed on to the motor shaft. Particular attention should be given to this work, as the complete eccentric assembly relies on tight-fitting parts. No keys or locking screws are used, mainly for ease of construction and lightness.

A strap of spring steel, ⅜in. x 1/16in., is fitted round the ballrace and held tightly in position by a nut and bolt (M in the diagram). The length of the strap is governed by the distance of the motor from the left spring-steel arm D. The ends of the steel strap are bent at right angles, drilled, and attached by the same nuts and bolts that hold the angle bracket E on one side of the unit. It is important that this strap from the eccentric to the unit be made from spring steel, as it has to absorb and transmit the complete movement of the eccentric.

All photographs by Rendell.

# Working Heights and Good Posture

By ELEANOR COUSTON,
Field Officer in Rural Sociology,
Department of Agriculture, Christchurch

**HOUSEWORK can keep you young. Is this statement true or false? It is true provided a happy and interested attitude is adopted and methods of work which conserve energy are used. Nervous tension is considered to be one of the major causes of fatigue, so a programme aimed at eliminating strain will also reduce the tendency toward overtiredness and irritability. One way in which this can be done is by learning correct body mechanics. Putting this knowledge into practice is the basis of good posture, which not only lessens fatigue but improves appearance and contributes to greater comfort and well-being.**

GOOD posture means the correct alignment of the body either during activity or while standing, sitting, or resting. When the body is well aligned there will be least strain on the internal organs, muscles, joints, and ligaments and a minimum amount of energy will be used. Continued bad posture will lead to restricted action of the diaphragm, crowding of the intestines, and finally to alteration in the shape of the curves of the spine. Apart from the health aspect, good posture greatly improves the appearance and clothes will look much more attractive.

## How to Attain Good Posture

### Standing

In the standing position the whole body should be in perfect balance. The feet are placed parallel and about 3in. apart, while the head is held well up and balanced above the shoulders, hips, and ankles. The shoulders should be relaxed and the upper part of the body pulled out of the hips. The knees are also slightly relaxed but straight, the lower abdomen is retracted, and the buttocks are tucked in. The toes point straight ahead and the weight of the body is borne through the ankle joints.

This sounds somewhat complicated, but the posture can be attained by a person lining up against a wall. Stand with the back to a wall with the heels 2in. to 3in. from the wall. The knees should be slightly relaxed, the shoulders dropped, and the chin drawn in with the back of the head touching the wall. The upper part of the body is then flattened against the wall until no hollow is left between the small of the back and the wall. A check in a full-length mirror will show how nearly the correct line-up has been reached. It may take time and practice, but gradually the muscles of the back, abdomen, and neck will become strengthened and less conscious effort will be required to maintain this position in standing and in walking.

Anyone standing for long periods will find it is less tiring to stand with the feet slightly apart and one foot slightly forward but with the weight distributed evenly on both feet.

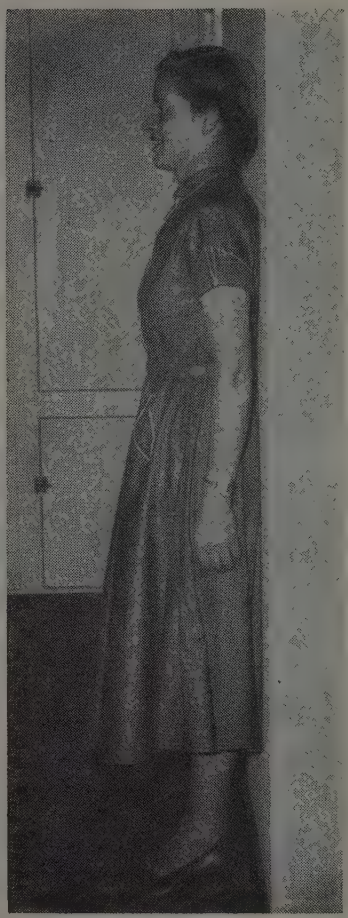
### Walking

Watching people as they walk can be a fascinating study, but one quickly realises how few people walk with grace of movement. Some stride along with their heads thrust forward, others slouch, and others walk with the feet splayed at an ungainly angle. Some who wear unduly high heels appear to be tottering.

Walking can be good exercise, but to obtain maximum benefit the line-up for the standing position should be remembered; stand tall with head above chest, chest above hips, and knees slightly relaxed. Then with toes pointing straight ahead the first movement should be a lift of the thigh while a relaxed knee swings forward from it. The upper body remains in perfect balance and the movement comes from the legs. A glance in a full-length mirror or shop window will help to detect poor walking habits.

### Sitting

It is no longer considered lazy to sit when doing such tasks as ironing or preparing vegetables, and skills can be acquired to do the work as efficiently when sitting as when standing. Prolonged sitting can also become tiring, but alternating between sitting and standing will give relief. There is a correct way of sitting also and correct posture is necessary to prevent backache and spreading and slackening of the muscles. As in standing, the head should be centred over the chest and hips, and the feet should rest flat on the floor either parallel or with one slightly in front of the other. When one is bending forward the movement should be in the hip joint and not in the spine.



Getting the line-up to improve posture.

Choice of chair is important, and for working a firm, straight or posture back chair is best. The chair must be the right height so that the feet reach comfortably to the floor and stooping or elevating the arms is avoided. The weight of the trunk should fall on the two knob-like bones which are the sitting bones, while the buttocks act as padding. The body should be placed well to the back of the chair seat and the spine should be comfortably supported by the chair back. Sitting in a slouched position may impair the functioning of internal organs and lead to spreading hips, while a

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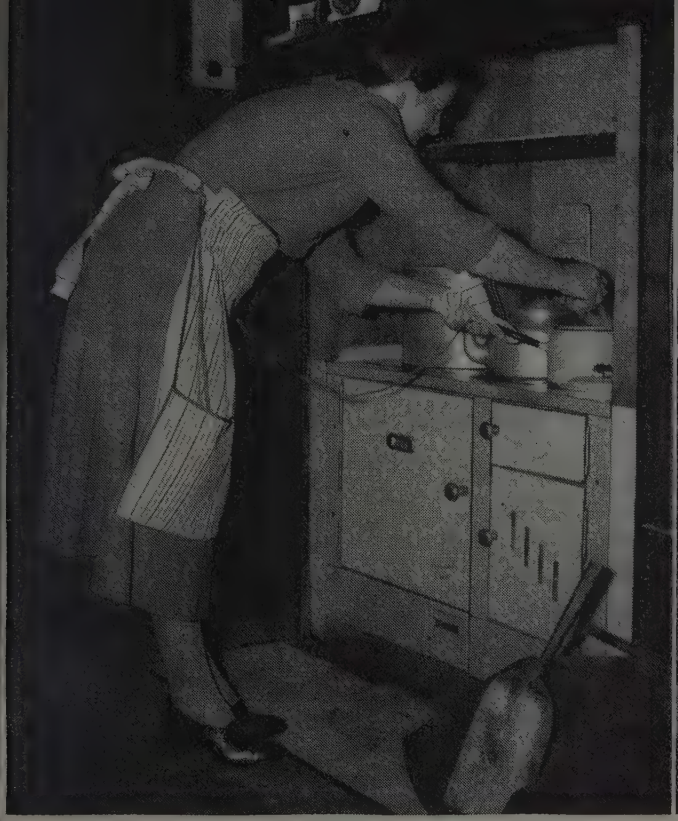


▲ Bending over a low-set stove places unnecessary strain on the muscles of the back.

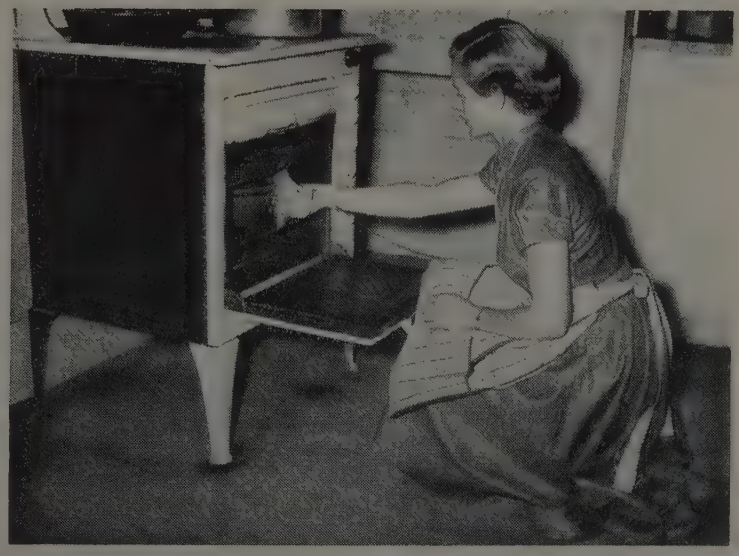
▲ Good standing. The body is erect and the arms are held at a comfortable level.

strained, edge-of-chair position will lead to pain and fatigue. Perching on a stool with knees aslant requires more energy than standing.

**Bending, Lifting, and Carrying**

To avoid unnecessary expenditure of energy bending, lifting, and carrying should be reduced to a minimum, and good choice of equipment and well-planned storage will help in this respect. However, these movements cannot be avoided altogether, so it is advisable to learn the methods which place least strain on the back and abdominal muscles. When bending stand with one foot slightly forward and bend from the knees, keeping the back straight. In this way the strong leg muscles take the strain and save the tension on the weaker muscles of the back. For getting up the same muscles are used. To look into a low cupboard or oven drop on one knee rather than strain the spine by bending from the waist.

Lifting is done in a similar way. Knee and thigh joints are bent and then straightened as the object is lifted. Pushing and pulling can also be done more easily from a partially



Good bending. Using the strong muscles of the legs will help to prevent backache.

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crouching position. Everyone should recognise her own muscular strength before lifting, pushing, or pulling and not attempt to move objects which are too heavy. Women often bring trouble on themselves by coping single-handed with heavy pieces of furniture or by struggling with a basketful of wet laundry.

When shopping articles or other articles are being carried the weight should be divided equally on either side, thus maintaining the balance of the body. If this lesson were learnt at an early age, there would be far fewer of the right-shoulder-lower-than-the-left people about today. It is less strenuous to make several trips than to carry too much at one time.

## Learning to Relax

Apart from poor working conditions one of the most frequent contributors to fatigue among housewives is the high pressure so often required to get things done on time. Nerves and muscles are keyed to a high state of tension and this reduces efficiency and increases the tendency to accidents. Many great people have learnt the art of relaxation in order to build up reserves quickly and effectively. The homemaker should learn this art also. Frequent short rest periods through the day are better than one long one.

Probably the best way to relax is to lie flat on the floor with a small pillow under the knees and then consciously to relax each muscle in turn. In other words the whole body should be quite free from tension and appear to be sinking into the floor. The mind too should be relaxed and cleared from worry or disturbing thoughts.

Some people can relax in the sitting position and others find it restful to recline with the back supported and the feet up. The back of the neck is frequently the hardest part to free from tension, and this can be helped by dropping the chin toward the chest and slowly rolling the head in a complete circle several times in each direction. Shrugging the shoulders helps to remove the tension from muscles in the upper back. Stretching too can relieve muscular tension and a good stretch of the whole body including the limbs will induce relaxation.

Relaxing at intervals throughout the day will prove worth while and greatly lessen the tendency to over-tiredness.

## Putting Good Posture into Practice

Having learnt how to stand and sit in the correct way the next step is to see that working surfaces are adjusted to the height of the worker. Stooping places much unnecessary strain on the muscles of the back and working with the arms elevated is also tiring.

Many old-fashioned ranges were installed very low and it was a back-breaking task cooking food on them with the head craned under a rack. Also many sinks and benches were too low and involved stooping each time dishes were washed. Little can be done to raise the height of a built-in range, but other types of cookers can sometimes be raised on blocks or lowered moderately easily. If the sink is too low, an improvement can be made by using a bowl, but the most satisfactory procedure is to raise the entire unit. This is an instance where expense is well justified.

Table legs can be modified more easily. Castors or blocks can be used to raise the height, or a few inches can be cut off the legs to lower it. One of the more modern ideas in kitchen planning is to use movable counters and these can be adjusted to individual heights more readily than fixed units.

## Heights for Work Surfaces

It is impossible to give accurate heights for working surfaces to suit different individuals and it is best for the housewife to work these out for herself. A good way to do this is to stand erect with the forearms raised in the position required for mixing food or for washing dishes without stooping. The distance from the floor to the hands will then be the best height for the mixing table or for the bottom of the sink. Other convenient heights such as those for laundry tubs or for the top of the stove can be worked out in a similar manner. The height of the sink bench is usually a few inches too high for comfort when food is being prepared, so an extra bench surface about 4in. lower is desirable. When an egg beater is being used or a mixture stirred the base of the sink may be the best place to stand the bowl.

GOOD POSTURE

Father happily takes his turn when the sink height is right and there is room for his toes underneath.

To estimate the height of surfaces to be used in the sitting position sit comfortably in a suitable chair with the feet on the floor. Raise the forearms and rest the hands on an imaginary table. Measure the distance from the floor to the hands and this will be the best height for a lap board or ironing table.

An article in "The Journal of Agriculture" for June 1955 describes the method of ascertaining the most convenient areas for storage.

The following table gives work heights for the housewife of average size.

| | Inches |
|---|---|
| 1. Sliding shelf or lap board | 24 to 26 |
| Stool .. .. .. | 14 to 17 |
| 2. Mixing surface .. .. | 32 |
| 3. Sink base .. .. .. | 32 |
| 4. Range .. .. .. | 36 |
| 5. Sink bench .. .. | Height of sink |

## Toe Space

A point to remember when planning any type of work unit is to allow for toe space underneath. Unless toe space is allowed it will be impossible for the

## WORKING HEIGHTS AND GOOD POSTURE

Good sitting. With an ironing board of adjustable height the worker can maintain good posture while either sitting or standing.

worker to stand erect while working. Toe space should be from 3in. to 4in. both in height and depth.

### Comfortable Ironing

Many women have used their kitchen tables for ironing, perhaps 6 hours a week each week in the year, and through working with a stooped back have placed considerable strain on the muscles and spinal column. A little ingenuity will soon produce a surface of the right height for this task. Ironing boards of many types are available, the ideal perhaps being a board of adjustable height which will fit the worker when either standing or sitting. For ironing some articles it is practical to have a lightweight board 18in. to 20in. wide which can be fitted to the ironing board to give extra width.

Carrying a heavy load of washing and bending to reach each article can be eliminated if a laundry cart or old perambulator is used.

Sometimes difficulty is encountered when a first attempt is made to do the ironing sitting down. The chief problems are that the legs of some boards get in the way of the worker's knees or that the shoulder position becomes uncomfortable. Manufacturers are working to overcome these problems. The most comfortable position is one where the body is erect and the arm sufficiently relaxed to move easily over the board. A swivel chair or stool assists the worker in freedom of movement both in the ironing and in reaching for the articles to be ironed and in placing them aside after completion. There is a tendency too for the iron cord to get in the way, and an attachment on the board which allows the cord to move freely is an asset.

### Using Long-handled Equipment

Another means of conserving energy and preventing backache is by using brooms, mops, and cleaners with handles long enough to prevent stooping. The kitchen floor may require a down-on-the-knees scrubbing occasionally, but a long-handled synthetic sponge mop with a self-wringing device will be adequate for in-between cleaning. It is advisable to use a stepladder or long-handled mop when cleaning walls or windows. Much unnecessary reaching is done from a chair and many unnecessary accidents have happened. Other long-handled equipment such as the ashpan and brush and a bath-tub brush can also be used to advantage.

### Use of Wheels

A final suggestion for preventing waste energy is the use of wheels and castors. Very often heavy furniture can be made mobile with efficient castors and this greatly reduces the energy required to move it for cleaning. A trolly will save many steps when the table is being set or cleared, and can be used as well for transferring washed china back to its cupboard. A base with wheels attached can be used to transport buckets of water and garbage pails. A basket of wet laundry is probably the heaviest and most cumbersome load of all and a laundry cart will not only transport the washing to the line but will also eliminate frequent stooping when the washing is being hung out. It is not necessary to go to great expense to improvise a trolly, as wheels can be attached to the legs of a canvas cot or an unused pram will serve.

After carefully measured tests of actual domestic tasks were conducted by the Home Economics Department at Wayne University, Detroit, U.S.A., the conclusion was reached that 75 per cent. of a housewife's walking, 75 per cent. of her bending and lifting, and 60 per cent. of her reaching could be avoided. Looking for methods to simplify a job adds interest, and when a simpler, quicker, and easier method is discovered the homemaker really enjoys a sense of triumph. Then if the tasks are carried out in a rhythmical way while good posture is maintained fatigue will be reduced to a minimum.

All photographs by Green and Hahn.

# Use of Perennials in the Flower Garden

**PERENNIALS provide a lot of colour in the garden. Some are mainly showy when they flower in summer, but others have attractive foliage for a long period. They are useful in the herbaceous border and in the mixed border; some are suitable for planting in larger rock gardens. Many perennials also provide excellent cut flowers. In this article K. H. Marcussen, Horticulturist, Department of Agriculture, Christchurch, discusses their requirements and uses in the flower garden. The garden work notes are by Elspeth Gray, Horticultural Instructor, Department of Agriculture, Auckland.**

IN the past perennials have mainly been considered as subjects for the herbaceous border. Today true herbaceous borders are seldom found, but perennials are being used throughout the garden.

Perhaps the reason for this change is that a herbaceous border is mainly a summer border and herbaceous perennials have a long off season. When they are used in combination with other types of plants advantage can be taken of their showy period to bring added colour into a section of the garden at a time when it otherwise might be dull.

Perennials are sometimes used in shrub borders, either for filling in until the shrubs are sufficiently large to make a display on their own or to cover up the front of subjects which have lost the lower branches and have become "leggy".

In the rock garden perennials have a definite use. Some are available in dwarf forms and many can be used in bold clumps in any large rock garden which is not furnished with true alpines.

Perhaps their greatest use is in what is termed the mixed border. Such borders are found in most gardens and in them are often placed many of the plants collected as slips from friends' gardens. Such borders resemble old English cottage gardens, being composed of shrubs, perennials, and bulbs, as well as annuals.

For anyone wishing to establish a true herbaceous border the following recommendations will be equally useful, as the requirements of the plants are the same wherever they are planted.

## Site and Situation

In many places the mixed border comes into being without proper planning and even if it has been planned in the layout of a garden, the site has seldom been chosen with thought for the welfare of the plants only.

It is therefore often a matter of choosing the most suitable subjects and by experience finding where a certain plant does best.

The ideal location for a border is one with an easterly or northerly aspect, well sheltered, but away from trees and vigorous growing shrubs whose roots will compete with the perennials for nourishment and moisture.

The width of the border will vary, but it should never be too narrow. A herbaceous border should not be less than 6ft. to allow enough space for variation in height. A border with walks on both sides will demand a greater width and calls for much greater care in planning, as generally one side will be in the shade of the taller-growing plants growing in the centre.

## Preparation for Planting

The preparation of a new border should be undertaken as early in the season as possible to enable the soil to consolidate before planting is done in autumn or early spring.

**The herbaceous border is useful for screening a boundary fence. Franzman photograph.**

# Useful Perennials, Their Habits, and Requirements

| Botanical name | Common name | Type | | Height | | | Habit | | | Flowering | | | | Colour | Situation | | | | Soil | | | | Hardiness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Herbaceous per. | Evergreen | Up to 1ft. | 1 to 3ft. | 3ft. and more | Upright | Spreading | Sprawling | Spring | Summer | Autumn | Winter | | Average | Sun | Shade | Seaside | Average | Moist | Dry | Sandy | Hardy | Frost tender |
| *Acanthus* | Bear's breeches | | ☆ | | ☆ | ☆ | | ☆ | | | ☆ | | | White-pink | ☆ | | ☆ | | ☆ | | | ☆ | ☆ | |
| *Achillea* | Yarrow | ☆ | | | ☆ | ☆ | ☆ | | | | ☆ | | | Various | ☆ | ☆ | | | ☆ | | | ☆ | ☆ | |
| *Aconitum* | Monk's-hood | ☆ | | | ☆ | ☆ | ☆ | | | | ☆ | | | Blue | ☆ | | ☆ | | ☆ | | | ☆ | ☆ | |
| *Althaea rosea* | Hollyhock | ☆ | | | | ☆ | ☆ | | | | ☆ | | | Various | ☆ | ☆ | | | ☆ | | | ☆ | ☆ | |
| *Alyssum saxatile* | | | ☆ | ☆ | | | | ☆ | | ☆ | | | | Yellow | | ☆ | | ☆ | ☆ | | | ☆ | ☆ | |
| *Anchusa italica* | Giant forget-me-not | ☆ | | | | ☆ | ☆ | | | | ☆ | | | Blue | ☆ | ☆ | | | ☆ | | | ☆ | ☆ | |
| *Anemone japonica* | Windflower | ☆ | | | ☆ | | ☆ | | | | | ☆ | | Pink-white | ☆ | ☆ | ☆ | | ☆ | ☆ | | ☆ | ☆ | |
| *Anthemis* | Chamomile | ☆ | | | ☆ | | | ☆ | | | ☆ | ☆ | | Yellow | ☆ | ☆ | | | ☆ | | | ☆ | ☆ | |
| *Aquilegia* | Columbine-Granny's bonnet | ☆ | | | ☆ | | | ☆ | | ☆ | | | | Various | ☆ | ☆ | ☆ | | ☆ | | | ☆ | ☆ | |
| *Arabis* | Rock cress | | ☆ | ☆ | | | | | ☆ | ☆ | | | | White | ☆ | ☆ | | ☆ | ☆ | | | ☆ | ☆ | |
| *Arctotis* | | | ☆ | ☆ | | | | | ☆ | ☆ | ☆ | ☆ | | Various | | ☆ | | ☆ | ☆ | | | ☆ | ☆ | ☆ |
| *Armeria* | Sea pink—Thrift | | ☆ | | ☆ | | | ☆ | | ☆ | | | | Rose | ☆ | ☆ | | ☆ | ☆ | | | ☆ | ☆ | |
| *Asclepias* | Butterfly bush | ☆ | | | ☆ | ☆ | ☆ | | | | ☆ | | | Various | ☆ | | | | ☆ | | | | | ☆ |
| *Asphodeline lutea* | Asphodel | | ☆ | | ☆ | ☆ | ☆ | ☆ | | | ☆ | | | Yellow | | ☆ | | ☆ | ☆ | | | ☆ | ☆ | |
| *Aster* | Michaelmas daisy | ☆ | | ☆ | ☆ | ☆ | ☆ | | | | ☆ | ☆ | | Various | ☆ | | | | ☆ | | | | | |
| *Astilbe* | Spiraea | ☆ | | | ☆ | ☆ | | ☆ | | | ☆ | | | Various | ☆ | | ☆ | | ☆ | ☆ | | | | |
| *Aubrietia* | Purple rock cress | | ☆ | ☆ | | | | | ☆ | ☆ | ☆ | | | Various | ☆ | ☆ | | | ☆ | | | ☆ | | |
| *Billbergia nutans* | | | ☆ | ☆ | | | | ☆ | | | ☆ | | | Green, blue, and red | ☆ | | | | ☆ | | | ☆ | | ☆ |
| *Bocconia cordata* | Plume poppy | ☆ | | | | ☆ | ☆ | | | | | ☆ | | Pink | ☆ | ☆ | | ☆ | ☆ | | | ☆ | ☆ | |
| *Buphthalmum* | Ox-eye | ☆ | | | | ☆ | ☆ | | ☆ | | | ☆ | | Yellow | ☆ | | | | ☆ | | | ☆ | | |
| *Campanula* | Bell flower | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | | ☆ | | Various | ☆ | ☆ | ☆ | | ☆ | | | ☆ | | |
| *Celmisia* | Alpine daisy | | ☆ | ☆ | ☆ | | | | ☆ | | ☆ | ☆ | | White | ☆ | ☆ | | | ☆ | | | | | ☆ |
| *Celsia* | | ☆ | | | ☆ | | | ☆ | | | | ☆ | | Yellow | ☆ | ☆ | | | ☆ | | | | | ☆ |
| *Centaurea* | | ☆ | ☆ | | ☆ | ☆ | ☆ | ☆ | ☆ | | | ☆ | | Various | ☆ | ☆ | | | ☆ | | | ☆ | | |
| *Centranthus* | | ☆ | | | ☆ | | | ☆ | | | | ☆ | | Red | ☆ | ☆ | | | ☆ | | | ☆ | | |
| *Chrysanthemum maximum* | Shasta daisy | ☆ | ☆ | | ☆ | | | ☆ | ☆ | | | ☆ | ☆ | White | ☆ | ☆ | | | ☆ | | | ☆ | | |
| *Chrysanthemum coccineum* | Pyrethrum | ☆ | | | ☆ | | | ☆ | | | ☆ | | ☆ | Various | ☆ | ☆ | | | ☆ | | | ☆ | | |
| *Cimicifuga* | | ☆ | | | | ☆ | ☆ | | | | | ☆ | | White | ☆ | | ☆ | | ☆ | | | | | |
| *Coreopsis* | | ☆ | | | ☆ | | ☆ | | | | | ☆ | | Yellow | ☆ | ☆ | | | ☆ | | | | | |
| *Delphinium* | | ☆ | | | ☆ | ☆ | ☆ | | | | | ☆ | ☆ | Various | ☆ | | | | ☆ | | | | | |
| *Dianthus* | Pinks | | ☆ | ☆ | ☆ | | | | | ☆ | | ☆ | | Various | ☆ | ☆ | | ☆ | ☆ | | | ☆ | | |
| *Dicentra* | Bleeding heart | ☆ | | ☆ | ☆ | | | ☆ | | | ☆ | | | Pink-white | ☆ | | ☆ | | ☆ | ☆ | | | | |
| *Dictamnus* | Burning bush | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Various | ☆ | ☆ | ☆ | | ☆ | | | | | |
| *Dimorphotheca* | Veld daisy | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Various | ☆ | ☆ | | ☆ | ☆ | | | ☆ | ☆ | ☆ |
| *Doronicum* | Leopard's bane | ☆ | | | ☆ | ☆ | ☆ | | | | ☆ | | | Yellow | ☆ | | | | ☆ | | | | ☆ | |
| *Echeveria* | Hen and chickens | | ☆ | ☆ | | | | | | ☆ | | ☆ | | Coral | | | | | ☆ | | | ☆ | ☆ | ☆ |
| *Echinacea purpurea* | Purple cone flower | ☆ | | | ☆ | ☆ | ☆ | | | | | ☆ | ☆ | Purple | ☆ | ☆ | | | ☆ | | | | | |
| *Echinops* | Globe thistle | ☆ | | | ☆ | ☆ | | | ☆ | | | ☆ | | Blue-white | ☆ | ☆ | | | ☆ | | | ☆ | ☆ | |
| *Echium* | | | ☆ | | | ☆ | | | ☆ | | ☆ | ☆ | | Various | | ☆ | | | ☆ | | | ☆ | ☆ | |
| *Erigeron* | | ☆ | | | ☆ | | | | ☆ | | ☆ | ☆ | | Various | | ☆ | | | ☆ | | | ☆ | ☆ | |
| *Eryngium* | Sea holly | ☆ | | | ☆ | ☆ | | | ☆ | | ☆ | ☆ | | Blue | ☆ | ☆ | | | ☆ | | | ☆ | ☆ | |
| *Felicia amelloides* | Agathea—Blue marguerite | | ☆ | ☆ | | | | | ☆ | | ☆ | ☆ | | Blue | ☆ | ☆ | | | ☆ | | | ☆ | | ☆ |
| *Gaillardia* | Blanket flower | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Yellow-red | | ☆ | | | ☆ | | | | ☆ | |
| *Galega* | Goat's rue | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Various | ☆ | | | | ☆ | | | | ☆ | |
| *Gazania* | Black-eyed Susan | | ☆ | ☆ | | | | | ☆ | | ☆ | ☆ | ☆ | Various | | ☆ | | ☆ | ☆ | | | ☆ | ☆ | ☆ |
| *Gentiana* | Gentian | | | ☆ | ☆ | | | | ☆ | | ☆ | ☆ | | Various | ☆ | ☆ | | | ☆ | ☆ | | | ☆ | |
| *Geranium* | Crane's bill | ☆ | | ☆ | ☆ | | | | ☆ | | | ☆ | | Various | ☆ | ☆ | | | ☆ | | | | ☆ | |
| *Gerbera* | Transvaal daisy | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Various | ☆ | ☆ | | | ☆ | | | | | ☆ |
| *Geum* | | | ☆ | ☆ | ☆ | | | | ☆ | | ☆ | | | Various | ☆ | ☆ | | | ☆ | | | ☆ | ☆ | |
| *Gunnera* | | ☆ | | | | ☆ | | | ☆ | | | | | Foliage | ☆ | ☆ | ☆ | ☆ | ☆ | | | ☆ | | |
| *Gypsophila* | Baby's breath | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Pink-white | | ☆ | | | ☆ | | | ☆ | | |
| *Helenium* | | ☆ | | | | ☆ | ☆ | ☆ | | | | | ☆ | Yellow-orange | ☆ | ☆ | | | ☆ | | | | | |
| *Helianthus* | Sunflower | ☆ | | | | ☆ | ☆ | | | | | ☆ | ☆ | Yellow | ☆ | ☆ | | | ☆ | | | | | |
| *Heliopsis* | Orange sunflower | ☆ | | | | ☆ | | | | | | ☆ | ☆ | Orange-yellow | ☆ | ☆ | | | ☆ | | | | | |
| *Helleborus* | Winter rose | | ☆ | ☆ | ☆ | | | | ☆ | | ☆ | | ☆ | Various | ☆ | ☆ | | | ☆ | | | | | |
| *Heuchera* | Coral bells | | ☆ | ☆ | | | | | | ☆ | ☆ | ☆ | | Pink-white | ☆ | ☆ | | | ☆ | | | ☆ | | |
| *Hibiscus* | Rose mallow | ☆ | | | | ☆ | | | ☆ | | | ☆ | ☆ | Pink | ☆ | ☆ | | | ☆ | | | ☆ | ☆ | |
| *Hosta* | Funkia—Plantain lily | ☆ | | ☆ | | | | | ☆ | | | | | Foliage | ☆ | | ☆ | | ☆ | | | ☆ | | |
| *Iberis* | Candytuft | ☆ | | ☆ | ☆ | | ☆ | | | ☆ | ☆ | | | White-pink | ☆ | ☆ | | ☆ | ☆ | | | ☆ | | |
| *Inula* | | ☆ | | | ☆ | ☆ | ☆ | ☆ | | | | ☆ | | Yellow | ☆ | | | | ☆ | | | ☆ | | |
| *Kniphofia* | Red-hot poker | | ☆ | | ☆ | ☆ | | | ☆ | | | ☆ | ☆ | Orange-red | ☆ | ☆ | | | ☆ | | | ☆ | ☆ | ☆ |
| *Leucophyta browni* | *Calocephalus browni* | | ☆ | ☆ | | | | | | ☆ | | | | Foliage | ☆ | ☆ | | ☆ | ☆ | | | ☆ | ☆ | ☆ |
| *Linaria* | Toadflax | ☆ | | | ☆ | ☆ | ☆ | | | | | ☆ | | Various | ☆ | ☆ | | | ☆ | | | ☆ | | |
| *Linum* | Perennial flax | ☆ | | | ☆ | ☆ | ☆ | | | | | ☆ | | Various | ☆ | ☆ | | | ☆ | | | ☆ | | |
| *Lobelia* | | ☆ | | | ☆ | ☆ | ☆ | | | | | ☆ | | Various | ☆ | ☆ | | | ☆ | | | | | |
| *Lupinus* | Lupins | ☆ | | | ☆ | ☆ | | | ☆ | | | ☆ | | Various | ☆ | ☆ | | | ☆ | | | | | |
| *Lychnis* | Maltese cross | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Various | ☆ | | | | ☆ | | | | | |
| *Lythrum* | | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Pink | ☆ | | | | ☆ | | | | | |
| *Mesembryanthemum* | Ice plant | | ☆ | ☆ | | | | | | ☆ | ☆ | | | Various | | ☆ | | ☆ | ☆ | | | ☆ | ☆ | ☆ |
| *Monarda didyma* | Bergamot | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Varied | ☆ | | | | ☆ | | | | | |
| *Nepeta mussini* | Cat mint | | ☆ | ☆ | | | | | | ☆ | ☆ | ☆ | ☆ | Lavender | | ☆ | | ☆ | ☆ | | | ☆ | ☆ | |
| *Oenothera* | Evening primrose | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Various | | ☆ | | ☆ | ☆ | | | ☆ | ☆ | |
| *Paeonia* | Peony | ☆ | ☆ | | ☆ | ☆ | | | ☆ | | ☆ | ☆ | | Various | | ☆ | | ☆ | ☆ | | | ☆ | ☆ | |
| *Papaver orientale* | Oriental poppy | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Various | | ☆ | | ☆ | ☆ | | | ☆ | ☆ | |
| *Pentstemon* | | ☆ | | | ☆ | | | | ☆ | | | ☆ | ☆ | Various | | | ☆ | | ☆ | | | ☆ | | |
| *Phlomis* | | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Various | | ☆ | | ☆ | ☆ | | | ☆ | ☆ | |
| *Phlox* | Perennial phlox | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Various | | ☆ | ☆ | | ☆ | ☆ | | | ☆ | |
| *Phygelius capensis* | Cape fuchsia | | ☆ | | ☆ | | | | ☆ | | | ☆ | ☆ | Orange | | ☆ | ☆ | | ☆ | | | | | ☆ |
| *Physalis alkekengi* | Winter cherry | ☆ | | | ☆ | | | | ☆ | | | ☆ | | Orange and red | | | ☆ | | ☆ | | | | ☆ | |
| *Physostegia virginiana* | Obedient plant | ☆ | | | ☆ | | | | ☆ | | | ☆ | ☆ | Pink-white | ☆ | | | | ☆ | | | | ☆ | |
| *Platycodon* | Balloon flower | ☆ | | | ☆ | | | ☆ | | | | ☆ | | Blue-white | ☆ | ☆ | | | ☆ | | | ☆ | ☆ | |
| *Polygonum* | | ☆ | ☆ | ☆ | ☆ | | | | ☆ | ☆ | | ☆ | | Pink | ☆ | ☆ | | ☆ | ☆ | | | ☆ | ☆ | |
| *Potentilla* | | ☆ | | | ☆ | | | | | ☆ | ☆ | ☆ | | Various | | ☆ | | | ☆ | | | | | |
| *Primula* | | | ☆ | ☆ | ☆ | | | | ☆ | | | ☆ | | Various | ☆ | | ☆ | | ☆ | ☆ | | | ☆ | |
| *Rudbeckia* | Cone flower | ☆ | | | ☆ | ☆ | ☆ | | | | | ☆ | | Yellow | ☆ | ☆ | | | ☆ | | | | ☆ | |

| Botanical name | Common name | Type | | Height | | | Habit | | | Flowering | | | | Colour | Situation | | | Soil | | | | Hardiness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Herbaceous per. | Evergreen | Up to 1ft. | 1 to 3ft. | 3ft. and more | Upright | Spreading | Sprawling | Spring | Summer | Autumn | Winter | | Average | Sun | Shade | Seaside | Average | Moist | Dry | Sandy | Hardy | Frost tender |
| *Salvia* | Sage | ☆ | | | ☆ | ☆ | | ☆ | | | ☆ | ☆ | | Various | ☆ | ☆ | | ☆ | ☆ | | ☆ | | ☆ | |
| *Saxifraga crassifolium* | | | ☆ | ☆ | | | | | ☆ | ☆ | | | | Pink | ☆ | | ☆ | | ☆ | | | | ☆ | |
| *Saxifraga umbrosa* | London pride | | ☆ | ☆ | | | | | ☆ | ☆ | ☆ | | | Pink | ☆ | ☆ | | ☆ | ☆ | | ☆ | | ☆ | |
| *Scabiosa caucasica* | Scabious—Pincushion flower | ☆ | | | ☆ | | ☆ | ☆ | | ☆ | ☆ | | | Various | ☆ | ☆ | | ☆ | ☆ | | | | ☆ | |
| *Sedum spectabile* | Stone crop | ☆ | | | ☆ | | | ☆ | | | ☆ | ☆ | | Pink | ☆ | ☆ | | ☆ | ☆ | | ☆ | ☆ | ☆ | |
| *Senecio* | | ☆ | | | ☆ | ☆ | | ☆ | | | ☆ | ☆ | | Various | ☆ | ☆ | | ☆ | ☆ | | ☆ | ☆ | ☆ | |
| *Sidalcea* | | ☆ | | | ☆ | ☆ | | ☆ | | | ☆ | | | Various | ☆ | | | | ☆ | | | | ☆ | |
| *Solidago* | Golden rod | ☆ | | | ☆ | ☆ | ☆ | | | | ☆ | ☆ | | Yellow | ☆ | | | | ☆ | | | | ☆ | |
| *Stachys lanata* | Lamb's ear | | ☆ | | ☆ | | | ☆ | | | ☆ | | | Purple | ☆ | ☆ | | ☆ | ☆ | | ☆ | ☆ | ☆ | |
| *Statice* | Sea lavender | ☆ | ☆ | | ☆ | | | ☆ | | | ☆ | | | Pink-blue | ☆ | ☆ | | ☆ | ☆ | | ☆ | ☆ | ☆ | |
| *Thalictrum* | | ☆ | | | ☆ | ☆ | | ☆ | | | ☆ | | | Various | ☆ | | | | ☆ | | | | ☆ | |
| *Tradescantia virginiana* | Moses in the bulrushes | ☆ | | | ☆ | | | ☆ | | | ☆ | | | Various | | ☆ | | | | ☆ | | | ☆ | |
| *Trollius* | Globe flower—Giant buttercup | ☆ | | | ☆ | ☆ | | ☆ | | ☆ | ☆ | ☆ | | Yellow | ☆ | ☆ | | | | ☆ | | | ☆ | |
| *Verbascum* | | ☆ | | | ☆ | ☆ | | ☆ | | | ☆ | | | Various | ☆ | ☆ | | ☆ | ☆ | | | | ☆ | |
| *Verbena* | | ☆ | | ☆ | ☆ | ☆ | | ☆ | ☆ | ☆ | ☆ | ☆ | | Various | ☆ | ☆ | | ☆ | ☆ | | ☆ | | ☆ | ☆ |
| *Veronica* | Speedwell | ☆ | ☆ | | ☆ | | | ☆ | | | ☆ | | | Various | ☆ | ☆ | | ☆ | ☆ | | ☆ | ☆ | ☆ | |

Attention to drainage and soil improvement is important; this was dealt with in detail in an article appearing in the October issue of "The Journal".

Fertilisers should be applied several weeks before planting and worked into the topsoil; basic slag at 6oz. to the square yard or superphosphate at 4oz. to the square yard are suitable dressings, the former being preferable for heavier soils.

Next in importance to the preparation of the soil comes the planning of the layout, a task which demands a lot of consideration.

A plan of the border should be drawn on paper and as decisions are made regarding the various plants to be used their positions should be marked.

Though the height of plants is generally graduated with the tallest at the back, this should not be done too regularly. A much better effect is achieved if the rise in height is brought about by placing clumps of varying height irregularly, instead of placing them in definite lines along the border. It is better to space a few plants of the same variety together in a clump than to scatter them individually through the border.

Apart from height, colour combination and contrast are of great importance and must be given attention.

The period and length of flowering are other factors which must be considered. Proper placing in relation to these factors will determine the display of colour throughout the season.

Some perennials prefer shade or moist conditions. They can be used in positions which are not suitable for most other plants.

Distance between plants will vary according to their height and spread. As a general recommendation plants growing up to 1ft. high should be planted 9in. apart, and those more than 3ft. high should be 18in. apart.

The chart on this and the opposite pages lists a number of useful perennials and gives details that should assist in planning a display; but apart from those mentioned, dahlias, chrysanthemums, and carnations can also be used.

## Planting

If the ground has been well prepared and a good plan has been made, planting is a relatively small job. It can be done from autumn to early spring, but spring planting should be completed before the new shoots start to grow.

Satisfactory planting cannot be done if the ground is too wet. If soil clogs on the boots, it is better to keep off the border until it has dried up, and heel in any plants that may arrive.

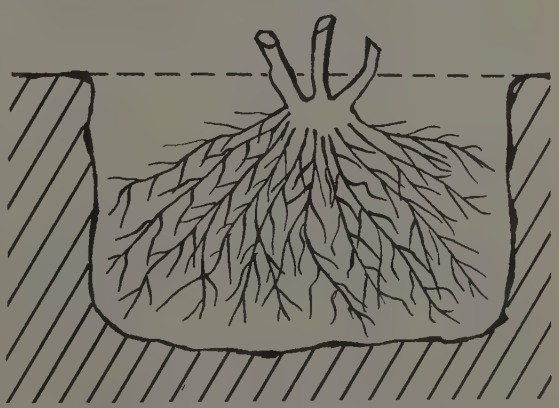
Working from the plan, the gardener should proceed to mark out where all the plants are to be placed and begin planting from one end, and so avoid tramping over the finished area. The roots of each plant should be checked over and any damaged or exceptionally long pieces cut off cleanly. The hole should be dug sufficiently large to accommodate the roots when they are spread out. The crown of each plant should be placed about an inch below the soil level and soil packed firmly round the roots.

Any plants that appear very tender can be mulched with straw or other open material.

Once the border has been planted a copy of the plan should be kept for reference. It will then be possible to check the identity of any plant, whether it is flowering or not.

## Maintenance

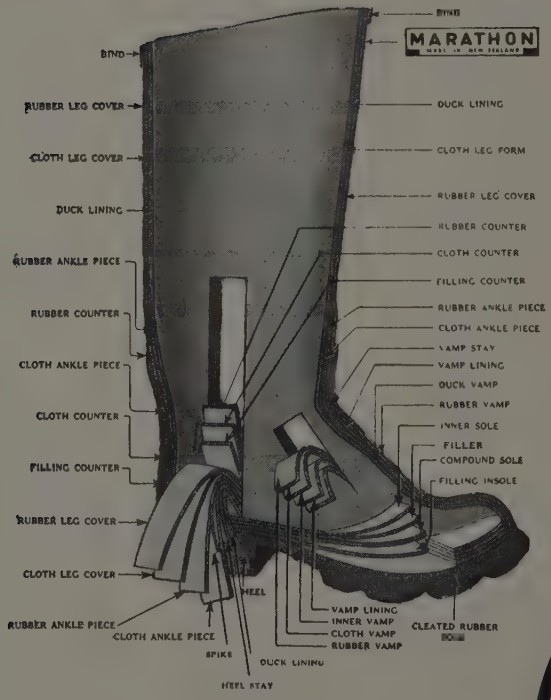
It is sometimes necessary to thin the shoots of established herbaceous perennials to assure the best development; if too many are allowed to grow, they will become spindly; three to six should be the average, according to the habit of the plant. The weakest ones should be removed, the cut being made close to their base to prevent regrowth developing.



Fibrous rooted herbaceous perennial being planted. Note the depth and how the roots are well spread out.

# MARATHON GUMBOOTS

## *by Skellerup*

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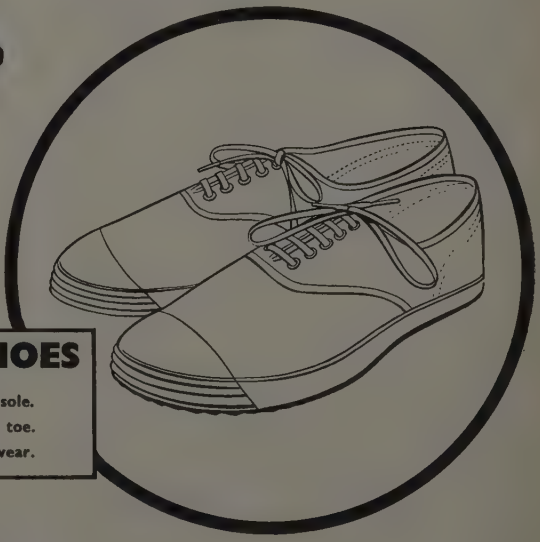

### CHAMPION TENNIS SHOES

A quality shoe in white Oxford with non-skid sole.
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Double foxing, toe cap and kick strip for long wear.

**MARATHON**

*–by Skellerup*

Most perennials growing more than a foot high must be supported. Stakes should be chosen to suit the individual plants; their height should be less than the ultimate height of the plant so that when flowering begins the stakes are not conspicuous.

Tying in should be done frequently, as required, to avoid damage and achieve neatness.

When plants are being staked and tied the aim should be to show the plant, not the stake.

If the soil has been deeply cultivated and organic material has been added before planting a good root system will generally develop. Watering will then be minimised, but during dry spells it may have to be done. Light watering should never be practised on established plants, as it tends to encourage shallow rooting; less frequent heavy watering is preferable, and the soil should be moistened to the full depth of the root run.

It is bad practice to water overhead in strong sunlight, and even when it is dull, flowers can be spoilt by this method. The perforated hoses are excellent for use in the border as they can be laid between the plants and have the water turned on at a suitable pressure.

A mulch may be kept on the border during summer to conserve moisture and provide the plants with a cooler soil. Mulching is also a means of improving soil texture, as a great worm activity will usually result; suitable materials include animal manure with plenty of litter, partially rotted compost, spent hops, peat, leafmould, lawn mowings, and coarse sawdust.

The animal manure is the only material that will readily supply plant nutrients; sawdust usually depletes the soil of nitrogen as it rots down. Fertilisers should therefore be applied with sawdust; for a 2in. to 3in. mulch 3oz. of dried blood or 2oz. of sulphate of ammonia per square yard, would be suitable.

Sawdust from timber treated with wood preservative should not be used, as the preservative may damage plants, and of course it will not rot down.

Fresh lawn mowings should be applied in a thin layer only at any one time; they will then wither and not rot into a sticky mat.

Any mulching material which tends to pack firmly or rot easily should be kept away from the stems of perennials, or the softening of the tissue may cause entry of disease organisms.

The soil should always be really moist when mulching material is applied and if necessary it can be supplemented several times during the season.

If a border is not covered with a mulch, the surface soil should be kept loose by hoeing. This is especially important after watering or heavy rain to facilitate aeration and prevent the soil from cracking. If frequent hoeing is carried out, weeds will not become a problem.

Perennials should be kept tidy and spent blooms removed whenever required. Many herbaceous perennials can be cut down when they have flowered and subjects which flower early in the season, such as delphinium, Oriental poppy, and pyrethrum will produce a second growth and flowers if cut back. When that is intended the plants will benefit by an application of quick-acting fertilisers or liquid manure.

## Annual Renovation

The annual renovation of the borders usually takes place in late autumn. Herbaceous perennials can then be cut back, if this has not already been done, and most evergreen subjects can be trimmed up.

If the border has been mulched during summer, the remains of the mulch should now be dug in. Borders which have not been mulched should be given a dressing of animal manure or compost before digging to maintain the organic matter content in the soil.

In early spring a dressing of fertilisers should be applied; a suitable mixture can be made up of 3 parts of blood and bone, 1 part of superphosphate, and 1 part of sulphate of potash. This mixture should be applied at up to 4oz. to the square yard.

Some plants multiply very fast and are best divided every year; for example, michaelmas daisies, of which a single shoot is sufficient to make a plant the next season. Others grow more slowly, but in general it can be recommended to lift and divide plants when they appear to be crowded.

Division can be carried out any time while the plants are dormant and many perennials can be propagated from cuttings taken from the new growth in spring. Details on propagation were given in last month's issue of "The Journal".

## Dahlias

Dahlias are among the most colourful perennials. Their flowering period is long; the individual flowers may be short lived, but new ones appear continuously.

They are sun lovers and will grow in most soils provided drainage is satisfactory, but being gross feeders their position should be prepared well in advance with a generous supply of animal manure or compost.

Before planting a dressing of fertilisers should be given of 1½oz. of sulphate of ammonia or 3oz. of dried blood, 2oz. of superphosphate, and 1oz. of sulphate of potash per square yard.

Distance apart, generally 1½ft. to 2½ft., will vary according to the type of plant and vigour of variety.

Dahlias are quick growing and it is wise to put in their stakes before they are planted to avoid damaging the tubers.

Small tubers or rooted cuttings will generally make the best plants and in northern districts these will flower longer than large clumps. Dahlias can also be raised from seed, but do not come true from the parent plants.

For general maintenance during the growing season they differ little from other perennials and their vegetative propagation was detailed last month.

Storage of dahlia tubers during winter can be a problem. They can be left in the soil, provided winter moisture is not excessive, but most gardeners prefer to lift them and prepare the border for next season's planting. They should then be stored in a dry, frost-free position where they are not exposed to wind.

## Chrysanthemums

The newer types of chrysanthemums have extended the flowering season of these plants so that they can now be had flowering from February until well into winter. The summer-flowering varieties are all suitable for growing in the border, as they are of medium size.

The requirements of chrysanthemums are similar to those of dahlias and to provide a rotation it is a good practice to alternate these two kinds of plants in the same position in alternate years.

Propagation in the home garden is usually by division, in which a rooted shoot is planted out in October; but better and more uniform plants will generally result if proper cuttings are made.

The plants should be stopped when they are 6in. to 8in. high. Stopping is the pinching out of the growing point to induce development of side shoots. Some of these, usually three or four, are left and they can be stopped a second time when they are some 6in. long. Fifteen to 20 branches can be left on the plant.

To ensure a supply of worthwhile flowers side buds should be removed as they appear. If the terminal bud, also called the crown bud, has been damaged, the highest good side bud can be left instead; if not enough flower stems have developed, two side buds can be left instead of the crown bud. The illustration on page 104 shows the development of a chrysanthemum plant after the stops.

Korean and pompon varieties should be stopped in the manner described, but they should not be disbudded.

## Carnations

There are two distinct types of perennial carnations:—

The border carnations, which flower once a year only, in December and January. They are hardy everywhere.

A well-grown, correctly staked, mature chrysanthemum plant. A—Position of first stop, carried out soon after setting in final position; two shoots developed. B—Position of second stop, carried out in late December; five shoots retained. C—Disbudded side shoot flowering on the crown bud. D—Two side buds were secured instead of the crown bud; these were disbudded.

The perpetual flowering carnations, which normally have their main flowering about the same time as the border carnations, but which can be induced to flower at other times. They are not so hardy, but can be grown outside in most parts of the country.

One difference between the two types is that the border carnations grow the foliage in a mat, but the perpetual flowering types grow upright by developing side shoots on the flower stems. This is a hint to their method of propagation, as "borders" are usually layered, and "perpetual" are usually raised from cuttings.

Cuttings root most readily in spring and autumn; layers are made in summer, soon after flowering, and can be planted out in autumn.

Unlike most other perennials carnations prefer fairly hardy conditions. A light open loam suits them and a position where they get plenty of sun and fresh air and where drainage is perfect is preferred.

They require the same thorough soil preparation as other perennials, but contrary to general opinion they should be given no more lime than most other plants. Nitrogenous manures and fertilisers should be applied with care or soft growth will result, and mulching should seldom be practised, as it will encourage fungous diseases. The soil should be kept open to improve aeration, and water applied only when the soil becomes really dry.

Border carnations require little special attention and will usually support themselves.

Perpetual flowering carnations should be "stopped" to encourage bushy growth of the plants and it is through this pinching out of the growing points that flowering can be regulated. It takes about 5 months for a plant to flower after it has been stopped.

Perpetual flowering carnations should be supported by stakes, and for garden culture it is wise to trim them up and cut them back to a bushy form after flowering has finished in autumn. They should be replaced by new plants at least every 3 years.

## Garden Work in February

In February thought should be given to the planting of spring flowering bulbs in rock gardens, special beds, and in mixed borders. Also in districts where bedding plants flower throughout the year plans for a bright display during winter should be made. The budding of roses, mentioned in last month's notes, can be carried on into February as long as the bark is lifting easily.

Evergreen hedges should be given their last trim before winter in colder districts so that the resulting new growth will have time to mature sufficiently to withstand the effects of early frosts.

### Gladiolus

Unlike the majority of bulbs and corms gladiolus should be lifted before the foliage has died down. The early flowering ones will be ready for lifting at the beginning of February or as soon as the leaves begin to change colour.

There are several reasons for lifting them soon after flowering, one being that the cormlets are not usually grown on in the home garden and if the corms are left in the soil too long, the cormlets become detached, some are missed at lifting, and they come up the following year, perhaps where they are not wanted.

There is also the danger of the leaves becoming infected with botrytis, a disease which ultimately affects the corms, and the possibility of serious infestation by thrips. After the corms have been lifted the foliage can be left on until it has dried, except when the leaves are known to be badly infected with disease. In the latter case the leaves should be cut off at ground level and burnt. A warm, airy shed is ideal for drying the corms, but very dry conditions may cause damage to the tissues. Dusting the corms with 5 per cent. DDT dust before they are stored for winter will control any thrips that may be left on them.

### Bulbs

Where ground has not been prepared for planting bulbs soil that is in a good condition should be selected

and a dressing of bonedust at 4oz. to the square yard worked in before planting. Good drainage is essential for the best results and, provided that this is available, the bulbs may be planted fairly deeply, especially if they are not to be lifted for several years. Small bulbs should always be planted closer to the surface than large ones and in lighter soils the planting depth will be correspondingly deeper. The minimum depth of planting for small bulbs such as freesias is 2in., which can be gradually increased to 5in. for hyacinths and similar large varieties.

A much better display usually results from spring flowering bulbs planted early in the season. They will not flower any earlier, but have more time to form a good root system, which improves the quality of the flowers and also enables the bulbs to increase more rapidly. For a long flowering season different varieties should be planted to take advantage of their slightly different flowering times. For early narcissi the paper whites and Soleil d'Or are two of the earliest to bloom. They are followed by lachenalias, jonquils, early daffodils, Dutch iris (Wedgwood), and freesias in that order.

## Chrysanthemums

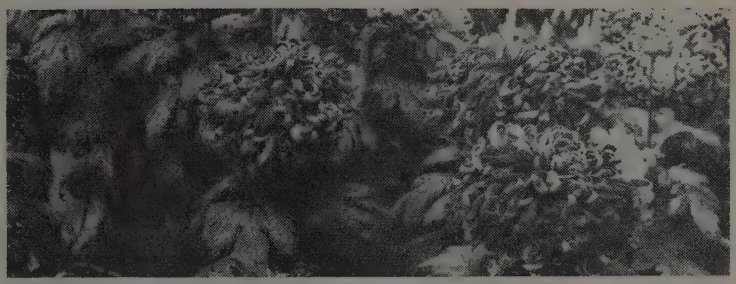
By now flower buds will have begun developing on chrysanthemums, whether they have been planted in beds or in pots. If exhibition blooms are wanted, hard disbudding will be necessary, leaving only the central or crown bud to flower.

Disbudding ensures that the maximum amount of food will reach the remaining buds, giving good-sized blooms suitable for showing. Another result of severe disbudding is, of course, that the flowering season is shortened, as the later flowers, which normally develop on laterals, are removed.

Unless exhibition blooms are wanted, little disbudding is needed for general garden display. Tying of chrysanthemums should be done as often as necessary for, if the plants are left, the weight of the flowers will often break the stems, especially in wind accompanied by rain. Liquid feeding should be continued until the buds are showing colour. Sprays for the control of rust should still be applied, using 3½ fl. oz. of lime sulphur to 4 gallons of spray plus colloidal sulphur at the rate recommended by the manufacturer.

## Hedges

In southern districts the less hardy evergreen hedges should be given their final trimming during February. If trimming is left later than this, the resulting new shoots are likely to be killed by frost and there will be very little growth coming away in spring. If frost-tender hedges are trimmed early, the shoots will have time to harden off and the hedges will look more attractive during winter. Even if the tips are killed, the buds further back will break quite readily when the warmer weather begins.



To get good chrysanthemum blooms like these disbudding must be carried out regularly.

## Everlasting Flowers

Everlasting flowers are now coming back into popularity with the increasing interest that is being paid to arrangements of dry material for keeping over winter. Those most usually grown are statice, helichrysum, and honesty. The first two have scaly petals that keep their colour very well when dried, and honesty is used chiefly for the seed pods which turn silver when fully ripe. Everlastings should be cut when the flowers are half open, tied in bunches, and hung upside down where they will get no sunlight and as little dust as possible. They should be left like this until the stems are stiff and dry and then stored in cardboard boxes until wanted for use.

## Bedding Plants

In districts where they will flower during winter and early spring there is still time to sow seed of cineraria, stock, antirrhinum, nemesia, schizanthus (butterfly flower), calendula, and winter flowering sweet peas. Provided that the plants are large enough before winter starts, they will supply plenty of colour, but later plantings will not flower until late spring.

*Primula malacoides*, violas, pansies, and iceland poppies should be planted out before the end of February; also anemones and ranunculus intended for winter flowering.

## Trees and Shrubs

In a new garden or in one that is being replanted there are usually several varieties of trees and shrubs that are wanted for planting during winter. The order for these should be placed with the nurseryman well in advance of the planting season to avoid disappointment. It often happens, especially with popular varieties, that the stock is sold out early in winter or that the plants that are left are not very good specimens.

By ordering well in advance the gardener is sure of getting what he wants and probably the plants will be better than they would be when the ordering is left to the last minute. Most nurseries have several grades of plants with different prices, so the approximate size of the shrubs that are wanted should be given when the order is placed.

## Cuttings

The cuttings of trees, shrubs, and perennials that were taken in January should be syringed with water every day to reduce wilting until they have formed roots. The callus that forms over the base of the cuttings is capable of taking up a certain amount of water from the soil and once this has formed the leaves become crisp. When the cuttings have formed roots new shoots start to grow and they can be transplanted either into a corner of the garden to grow on or into their permanent positions. It is better to delay the planting out until autumn, when the soil contains more moisture, as if they are transplanted during summer, watering will be necessary to keep the plants alive.

## Cyclamen

Corms that have been dormant during the main part of summer and are wanted for flowering inside during winter can be repotted in February. The corms should be taken out of the pots, all the old soil removed, and a mixture of loam, compost, and sand used for repotting, with broken crocks or gravel in the bottom for drainage. When cyclamen are being watered it is best to avoid spraying water on to the corms, as if they remain wet over a long time, they will rot. The plants should be kept in a cool position, rooms being avoided that become hot and dry due to fires or heaters during winter.

# Fig Dishes

By BETTY M. JOHNSTON,
Field Officer in Rural Sociology, Department of Agriculture, Wellington

MOST people think of figs as rather sticky, brown objects that come suitably enclosed in small boxes from the Middle East. Few realise that fig trees flourish in the warmer parts of New Zealand, bearing crops of dark, bronze-green fruit which the gourmet rates as a delicacy. The flavour of fresh figs is quite unlike that of the dried fruit and though it may not please everyone, those who have acquired a taste for it are loud in its praises. In this article recipes are given for both fresh and dried figs. Naturally the colour and flavour are better when fresh fruit is used.

## Cold Desserts

### Fig Bavarian Cream

½ cup of chopped figs
1½ tablespoons of gelatine
4 fl. oz. of cold milk
3 egg yolks
4oz. of sugar
Pinch of salt
12 fl. oz. of scalded milk
1 teaspoon of vanilla
½ pint of whipped cream

(Serves 6)

Soak the gelatine in the cold milk for 5 minutes. Beat the sugar, yolks, and salt together until they are light. Add the scalded milk and mix all the ingredients thoroughly. Cook the mixture in a double boiler or over hot water, stirring it constantly until it coats a metal spoon. Add the gelatine and stir it into the mixture until it has dissolved. Fold ⅔ cup of chopped figs into the Bavarian cream and when it is cool fold in the whipped cream. Pour the cream into a mould which has been dipped in cold water and chill it until it is firm.

### Fresh Fig Whip

¾ cup of mashed stewed figs
½ teaspoon of gelatine
6 fl. oz. of cold water
3 egg whites
12 fl. oz. of hot fruit juice
3oz. of sugar
1½ tablespoons of lemon juice

(Serves 6)

Cook the fresh fruit until it is soft, and then mash it. Soak the gelatine in the cold water for 5 minutes. Add the hot fruit juice and half the sugar to the gelatine and stir the mixture until it has dissolved. Next add the lemon juice and leave the mixture to cool. When it is beginning to set add the fruit pulp and beat the mixture until it is frothy. Beat the egg whites to a soft foam, add the remaining sugar, and beat the egg-sugar mixture until it is stiff. Fold it into the gelatine mixture. Serve the whip either in individual dishes or pour it into a cold, wet mould. Serve cream or a custard made with the egg yolks with the whip.

## Hot Desserts

### Fig Pie

2 well-beaten eggs
2 tablespoons of sugar
¾lb. of stewed dried figs
¼ teaspoon of salt
1 baked pastry shell
2 egg whites
2 tablespoons of sugar

Combine the eggs, salt, sugar, and cooked figs in the top of a double boiler. Cook them slowly until the egg thickens (stir constantly). Pour the filling into the pie shell and top it with a meringue mixture made by beating two egg whites with 2 level tablespoons of sugar. Brown the meringue in a moderate oven (350 degrees F.) for 10 to 12 minutes.

### Figs Annette

2½ cups of stewed figs
2oz. of sugar
1 tablespoon of cornflour
1 tablespoon of butter
Pinch of salt
¼ teaspoon of nutmeg
Dash of cinnamon
3 tablespoons of lemon juice
1 teaspoon of grated lemon rind
Sliced sponge cake or shortcake

(Serves 6)

Drain the figs. Add the sugar to the fig syrup and bring it to the boil.

Mix the cornflour with a little cold water and stir it carefully into the syrup. Cook the syrup, stirring it constantly until it thickens. Cook it for a further 10 minutes over hot water. Add the other ingredients. Place 2 or 3 figs on slices of sponge cake or shortcake. Pour the hot sauce over the cake.

## Biscuits

### Fig Newtons

4oz. of butter
12oz. of sugar
1 well-beaten egg
4 fl. oz. of milk
1 teaspoon of vanilla
½ teaspoon of salt
12oz. of sifted flour
3 teaspoons of baking powder
1 cup of chopped dried figs

Cream the butter and 8oz. of the sugar. Add the egg and beat the mixture until it is light. Mix the milk and the vanilla. Sift the flour, baking powder, and salt together. Add the dry ingredients alternately with the milk to the creamed mixture. Blend them well. Roll out the dough thinly on a slightly floured board, forming a rectangle. Boil the figs with the remaining sugar and 1 cup of boiling water for 5 minutes. Spread the cooled fruit on half of the dough. Fold the other half over the covered dough and cut out small oblong biscuits. Bake them in a quick oven (400 degrees F.) for 12 to 15 minutes.

### Fig Biscuits

6oz. of butter
6oz. of brown sugar
2 eggs
10oz. of sifted flour
1½ teaspoons of salt
2 teaspoons of baking powder
1 teaspoon of vanilla
¾ cup of chopped figs

Cream the butter and sugar, adding the beaten eggs one at a time. When the mixture is light and creamy add the flour, salt, and baking powder sifted together. Add the vanilla and the figs. Chill the dough. Roll it out thinly and cut out the biscuits. Sprinkle them with sugar and bake them in a moderate oven (350 degrees F.) for 12 to 15 minutes.

Fig annette.

## Bread

### Fig Bread

1lb. of sifted flour
4½ teaspoons of baking powder
1 beaten egg
1 tablespoon of butter
1 teaspoon of salt
4oz. of sugar
12 fl. oz. of milk
1 cup of chopped figs

Sift the dry ingredients, sifting a little of the flour over the chopped figs. Add the milk, egg, and melted butter to the flour mixture and mix the dough thoroughly. Stir the figs into the mixture and then shape the dough into a loaf. Place it in a greased loaf tin. Bake the loaf in a moderate oven (350 degrees F.) for 45 to 60 minutes.

Fig Bavarian cream. Sections of pale-pink fruit are used to decorate fig Bavarian cream, which is served in individual pale-green glass dishes.

## Preserves

### Fig Preserve

Use equal parts by weight of sugar and peeled whole fruit. Add enough water to prevent the fruit sticking to the bottom of the pan. Cook the figs until the syrup is quite thick and the fruit begins to look translucent. Fill clean, preheated preserving jars three-quarters full with figs and add sufficient syrup to fill them. Seal the jars while they are still hot.

### Rhubarb and Fig Jam

Cut young, tender rhubarb into pieces 1in. long. Peel fresh figs. Use 1lb. of rhubarb to 1lb. of figs. Allow 1½lb. to 2lb. of sugar for each 2lb. of the mixed fruit. Cover the rhubarb with part of the sugar and allow it to stand for an hour or two to extract the juice. Crush the figs and mix them with the rhubarb. Heat the fruit-sugar mixture slowly, stirring the jam until it is boiling. Add the remainder of the sugar and when the jam is boiling again turn down the heat. Allow the jam to simmer for 15 to 20 minutes or until it is thick. Pour it into clean, preheated jam jars. Seal the jars while the jam is still hot, using melted paraffin wax or transparent cellulose.

# Altering and Using Commercial Patterns

By MARY HUNT,
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NEARLY every woman gains a great deal of pleasure from wearing a well-fitting frock she has made herself. The need for ready-made patterns was met in the middle of the 19th century by the introduction of commercial patterns, which have made home dressmaking very much simpler. Commercial patterns are cut to fit people with standard measurements, but unfortunately many people differ from the average in one or more measurements. For this reason it is important to know how to alter patterns.

## Choosing the Pattern

THE pattern should be chosen before the material is bought, as the style governs the amount of material needed. When a pattern is bought it should never be considered by itself, but always in relation to the individual and her needs. A pattern should be chosen which suits the figure, the personality, the material chosen, and the purpose for which the finished garment will be worn. It should be bought according to bust size, as it is easier to alter the waist line and the skirt than the bust.

When it has been decided which view will be used the pattern pieces can be sorted out and those which will not be needed replaced in the envelope. All pattern markings should be clearly understood and the amounts which are allowed for seams and hems should be checked.

## Taking Measurements

Measurements should preferably be taken over a slip, but they can be taken over a well-fitting dress with a smoothly fitting skirt and a normal waist line. If they are taken over a slip, all seam lines must be located and marked in with tailor's chalk or a soft pencil. All measurements should be taken firmly, but not too tightly, in the way shown in Fig. 2.

Fig. 1—Measurements should be taken carefully over a slip or a well-fitting frock.

1. Bust front and back, taken separately over the fullest part.
2. Chest width, taken 6in. down from the shoulder at the neck edge.
3. Back neck seam from one shoulder to the other.
4. Upper back width.
5. Width across the shoulder blades, taken 7in. down from the shoulder at the neck edge.
6. Blouse length at the centre front.
7. Blouse length at the centre back.
8. Blouse length over bust.
9. Blouse length over the shoulder blades.
10. Armhole depth from the shoulder seam at the neck edge to a line level with the bottom of the armhole.
11. Shoulder height, from the top of the armhole to a line level with the bottom of the armhole.
12. Under-arm length or side seam.
13. Shoulder length from the neck edge to the armhole.
14. Sleeve length, from the top of the armhole to the wrist with the arm bent.
15. Sleeve cap length from the top of the armhole to a cord tied round the arm, level with the bottom of the armhole.
16. Upper arm or sleeve width round the fullest part of the upper arm.
17. Elbow width with the arm bent.
18. Waist line: Take the front and back measurements between the side seams.
19. Hips at the fullest part. Record the distance from the waist.
20. Skirt length.

All these measurements should be checked against those taken in the same positions of the pattern pieces. The bust will be measured 2in. below the bottom of the armhole on the pattern. The seams and ease on the pattern should be allowed for. Most patterns allow 2in. ease over the front bust and 1in. to 2in. at the back; 2in. to 3in. over the hips; and 1½in. in the sleeve above the elbow and 1in. below.

## Altering the Pattern

In altering the width of the pattern the difference should be divided between the front and the back, the amounts depending on the individual measurements. For instance, for a full bust more will be required in the front than in the back.

1. **Increasing the width of the blouse:** Cut the pattern from the waist to the shoulder parallel to the centre line as in Fig. 3A. Spread the pieces apart the required amount and pin in an extra piece of paper (Fig. 3B). Straighten the shoulder seam as shown by the dotted line.

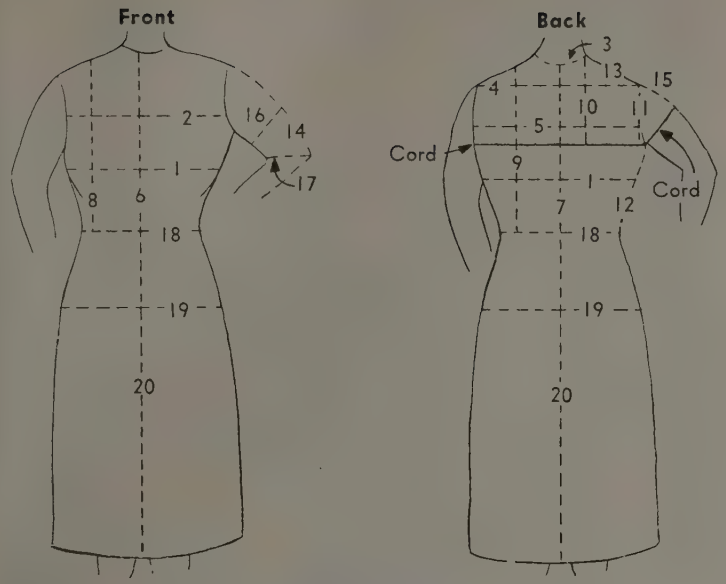


Fig. 2—Where to take measurements (for key to figures see text on opposite page and on this page).

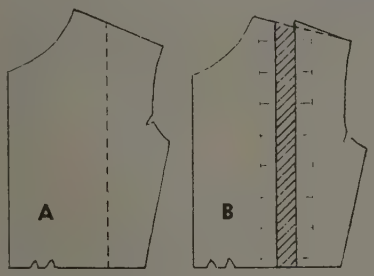


Fig. 3—Increasing the width of the blouse.

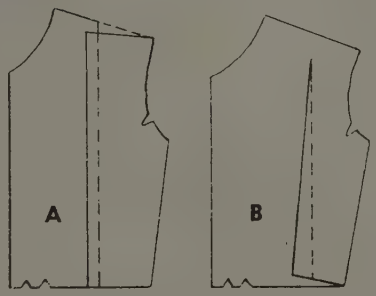


Fig. 5—Decreasing the width of the blouse.

2. **To widen the bust measurement without altering the shoulder:** Cut the pattern almost to the shoulder line and spread the pieces until the bust (2in. below armhole) is the correct width (Fig. 4). If the waist measurement is increased too much, trim the side seam below the bust, as shown by the dotted line.

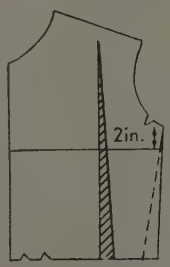


Fig. 4—Widening the bust measurement without altering the shoulder.

3. **To decrease the width of the blouse:** Cut the pattern in the same way as for widening, but lap one piece over the other instead of spreading (Fig. 5A and B). Adjust the shoulder line in A and the waist line in B.

4. **To increase the bust measurement and decrease the shoulder and chest measurements:** Cut the pattern as shown in Fig. 6A. The line X—Y is cut almost to the armhole, ½in. above the bottom armhole. Lap section a over section b and pin. Spread section c from section b (Fig. 6B). Measure the bust line on the new angle. Adjust the shoulder line, waist line, and side seams as shown by the dotted lines.

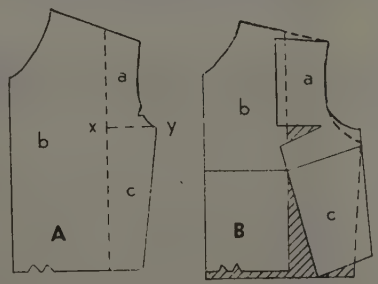


Fig. 6—Increasing the bust measurement and decreasing the shoulder and chest measurements.

5. **To lengthen the blouse:** Cut the pattern below the bust line, parallel to the waist, and spread the pieces as shown in Fig. 7A. If the pattern is too short between the shoulder and the bust, cut and spread above the bust as shown in Fig. 7B.

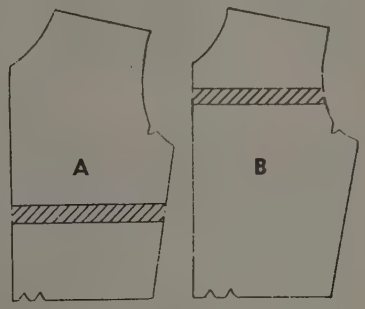


Fig. 7—Lengthening the blouse.

6. **To lengthen the skirt:** Add half of the required amount by cutting and spreading below the hip line and add the other half at the hem line (Fig. 8). Keep the centre front and centre back in a straight line.

7. **To shorten a flared skirt:** Cut the required amount from the hem line as shown by the dotted line a—b in Fig. 9A. To retain the full amount of flare cut from the hem almost to the waist line. (Fig. 9B) and spread the hem line to fit the cut-off piece, which should be pinned back over the pattern to hold it in place. Do not alter the position of the straight grain.

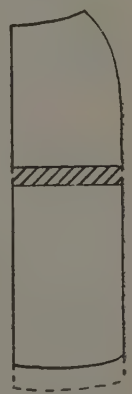

Fig. 8—Lengthening the skirt.

8. **To widen the skirt:** To enlarge the waist and hips cut from the hem to the waist and spread (Fig. 10A). To enlarge the hips without altering the waist cut almost to the waist and spread the required amount at the hips (Fig. 10B). If too much flare is

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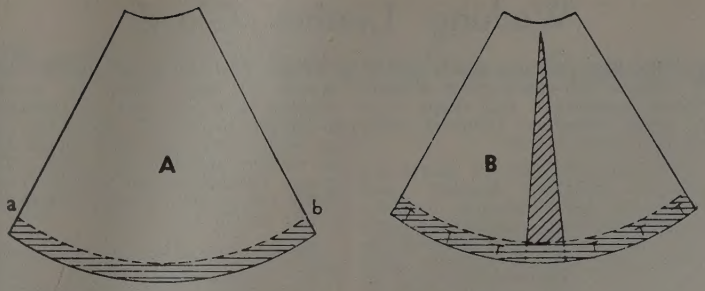



Fig. 9—Shortening a flared skirt.

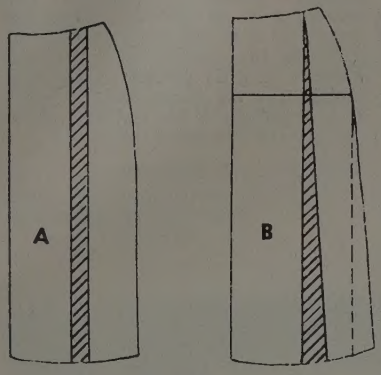



Fig. 10—Widening the skirt.

added, trim the side seam below the hip as shown by the dotted line.

9. **To lengthen the sleeve:** Cut the sleeve above and below the elbow and spread equal amounts (Fig. 11). Keep the straight grain line in position.

10. **To widen the sleeve:** Cut on the straight grain line from the shoulder almost to the wrist. Spread as shown in Fig. 12A and re-mark the straight grain line in the centre of the slash as shown by the large dots. If the wrist needs widening, spread at the bottom as well. This method increases the fullness at the top of the sleeve. Widen a short sleeve in the same way, by cutting and spreading as in Fig. 12B.

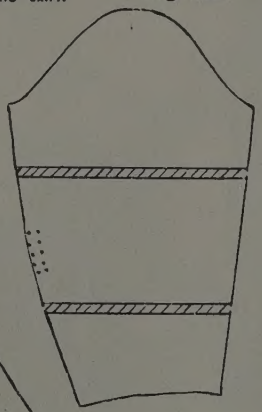


Fig. 11—Lengthening the sleeve. →

11. **To widen the sleeve without altering the sleeve cap:** Cut off the sleeve cap at a—b in Fig. 13. Cut from the top to the bottom of the lower part and spread. Replace the sleeve cap. When the sleeve is being fitted it will be necessary to ease it a little under the arm.

Extra width may be needed in the sleeve cap and not the lower sleeve.

12. **To decrease the width of the sleeve:** Draw two cutting lines through the sleeve parallel to the straight grain 1½in. each side of the top shoulder. Lap the pieces over equal amounts, taking care not to make the sleeve too narrow. Draw in the new top-of-sleeve line (Fig. 14).

13. **To give extra width over the elbow:** Draw a cutting line from top to bottom of the sleeve pattern parallel to the straight grain. Draw another at the elbow at right angles to the first (Fig. 15). Spread b and c from a as shown, allowing 1in. fullness. Draw in a good elbow curve.

### Checking the Pattern

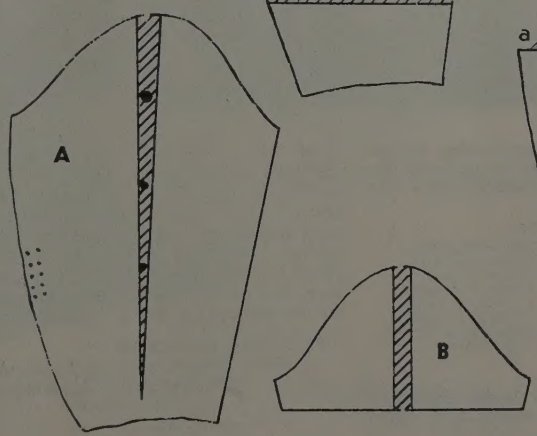
Before cutting the material check the altered pattern carefully to see that seam and grain lines are in the correct position, that centre front and centre back lines are straight, and that sufficient ease has been allowed in all parts. Make sure that all pattern markings are understood.

## Preparing the Material

If the material is not guaranteed shrink proof, it is always advisable to shrink it before cutting. Time spent at this period will not be wasted, as it will prevent the finished garment from shrinking and becoming unwearable after the first wash.

When materials for washing frocks are being bought it is advisable to make sure that they are washable and colour fast.

Fig. 12—Widening the sleeve. ▼



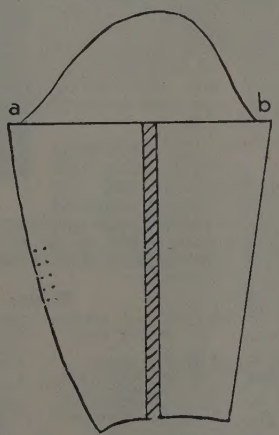




Fig. 13—Widening the sleeve without altering the sleeve cap.

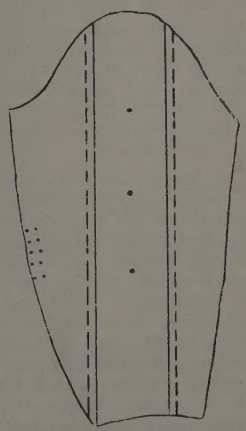


Fig. 14—Decreasing the width of the sleeve.

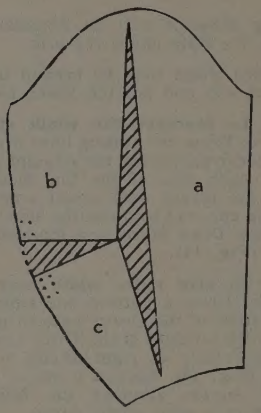



Fig. 15—Giving extra width over the elbow.

Cotton, linen, and rayon can be dipped in cold or luke-warm water and hung out to drip, but the material should not be wrung out. It depends on the material whether it should be ironed while still damp or left to dry. To shrink woollen material it can be rolled up in a damp sheet and left overnight. It is then pressed on the wrong side with a cloth until it is nearly dry. The iron must not be pushed backward and forward over the material. The material should be left flat until it is dry.

### Laying out the Pattern for Cutting

To assist laying out the pattern on the material a cutting guide is provided with the pattern. All pieces should be placed in position before cutting is started. Care is necessary in laying the pattern pieces on the straight grain of the material.

All checks and stripes must be matched on the seam lines. Matched patterns should always be tacked firmly to avoid slipping when sewing. If the material has a nap or one-way design, it should be in the same direction on all pieces.

The layout must be checked and the pieces pinned down round the edges before the material is cut. It is advisable to cut all notches outward and not inward as marked on the pattern. When all the pieces are cut out construction markings must be transferred on to the material with tailor's tacks, pins, or tailor's chalk. Tacking and fitting can then be begun, care being taken to tack all close fitting parts firmly to get a true fit. The sewing guide provided with the pattern will give the best procedure.

# Washing Leather Gloves

WASHABLE leather gloves of all grades will retain much of their original appearance and shape if a few simple rules are followed when they are being cleaned.

First make sure that the gloves are labelled washable, hogskin and chamois skin being examples of washable glove leathers. An old and well-known firm of glovers recommends washing such gloves in mild soap suds, using a mild, neutral soap or soap flakes. Soapless detergents remove too much grease from the skin, resulting in a loss of suppleness and a feeling of harshness.

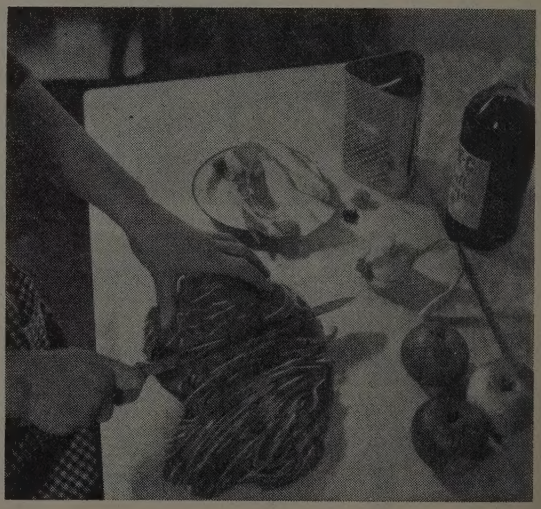
The water should be tepid, never hot, as heat hardens and shrinks even the best of leathers. The gloves are completely immersed in the suds and are squeezed gently but thoroughly to remove the dirt. Any very dirty spots may have a few dry soap flakes rubbed in with the finger tips, but scrubbing with a brush is definitely not recommended. The bristles would score the skin surface and contribute unnecessarily to wear.

When the gloves are clean they should be well rinsed in several changes of warm water, as contrary to popular belief, soap allowed to dry on leather does not improve the feel or prolong the life of gloves. The gloves should be gently pulled into shape and excess moisture patted out with a towel.

They can be dried flat on a towel, placed on glove stretchers (wire frames shaped like gloves), or pinned on a line, but they should **never** be dried in bright sunlight, which would probably result in hardening and darkening of the leather. When the gloves are nearly dry gently rub and work the skin until it feels soft and supple. A little lanolin cream first rubbed into the hands may be beneficial, especially if the leather feels at all harsh or excessively dry.

*—BETTY M. JOHNSTON,*
*Field Officer in Rural Sociology,*
*Department of Agriculture,*
*Wellington*

# Red Cabbage



RED cabbage is usually served cold as a pickle, but it can be used equally successfully served hot, making a colourful, sweet-sour accompaniment for many meat dishes, particularly pork, veal, tongue, duck, or goose. It will lose its colour unless cooked with an acid, so vinegar and apples are used to retain this.

The following recipe comes from Europe and red cabbage prepared this way will be popular either with a main course or for a tea or luncheon dish served with mashed potato and bacon.

**Recipe**

1 small red cabbage (or half a large one)
2 cooking apples, peeled and chopped
3 or 4 cloves
Pinch of nutmeg
2 rashers of bacon
Salt and pepper
2 tablespoons of brown sugar
1 cup of vinegar
1 clove of garlic finely chopped
Butter or other fat for frying

**Method**

Shred the cabbage finely. Melt the butter and fry the garlic and bacon in it for a few minutes. Add the shredded cabbage. Mix well. Add the remaining ingredients and mix well again. Cover the saucepan with a tight fitting lid and simmer until the cabbage is tender (about 1½ hours). More vinegar can be added if necessary to prevent the mixture burning on the bottom of the saucepan.

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*Department of Agriculture,*
*Christchurch*



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